सत्यमेव जयते

INDIAN AGRICULTURAL
RESEARCH INSTITUTE, NEW DELHI

I. A. R. I. 6.
MGIPC—S1—6 AR/54—7-7-54—10,000.

Volume XXVIII Part 1

QUEENSLAND AGRICULTURAL JOURNAL

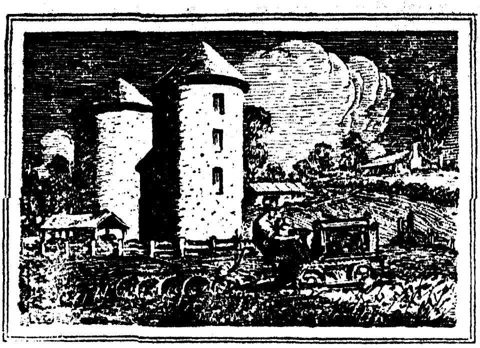
Issued by direction of

The Hon. the Secretary for Agriculture

25944
IARI

Edited by J. F. F. REID

1 JULY, 1927



PRODUCTION

There is dignity in the production of things that sustain the lives and provide the pleasures of the peoples of the World.

To-day there is high scientific attainment and the greatest efficiency in the methods of production, whether primary or secondary.

The Farmer as well as the Manufacturer, and business men generally, demand the highest efficiency and security in any service they use, and this must necessarily apply to the Banking Service which plays so large a part in all modern production, manufacture, and business.

The Commonwealth Bank of Australia provides a most efficient banking service from its Branches in the principal towns of Australia and its 3,460 Post Office Savings Banks

Commonwealth Bank of Australia.

GUARANTEED BY THE COMMONWEALTH GOVERNMENT

EDGAR SANDALL

SUNNYBANK NURSERY

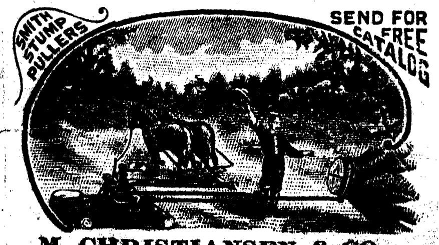
SUNNYBANK, NEAR BRISBANE

SOUTH COAST LINE

Once again the time has come round for ordering your requirements in Citrus Fruit Trees—as early as possible—from the leading Citrus Nursery. The trees with plenty of fibrous rootlets. Orange stocks guaranteed.

SEND FOR CATALOGUE. POSTED FREE 'PHONE J 3969

THE SMITH STUMP-PULLER



This admirable appliance is reputed to save 75 per cent. of labour.

Prices from £15 to £59 10s.

Guaranteed breaking strain, 12 tons to 60 tons. Its working is simplicity itself.

Catalogues on Application.

Trials can be arranged in each State.

Note.—Trial Government Farm, Glen Innes, 11 acres cleared in 12 days.

M. CHRISTIANSEN & CO.
LIVERPOOL .'. N. S. WALES

Sole Agents for Australasia and New Zealand.

or J. Christiansen, Collins Street, Annerley, South Brisbane.

CONTENTS.

Page.

Event and Comment—

Queensland's New Governor 1
Our Rich North 2
A White Man's Country 3
The Problems of the Dairying Industry 3

Bureau of Sugar Experiment Stations—

Entomological Hints to Canegrowers 4
Cane Pests and Diseases 5
Field Day at Bundaberg 6
Cane Pest Combat and Control ... 7
Field Reports 9
Maize Storage and Weevils 12
Cane Growing and its Problems ... 13
Spotted Wilt of Tomatoes 28
Rainfall in the Agricultural Districts 31
Agricultural Problems 33
Snake Skins for Profit 46
Queensland Trees 46
Fat Lamb Raising 49
Pig Raising in Australia 51
The Pig Section at Brisbane Show ... 54
Fallowing 57
Retirement of Mr. Winks 58
Banana Growing in Queensland ... 60
Porducers' Problems 64
Preserves 67
Peanut Growing 68
Poultry Diseases 70
Durum Maize 74
Abstracts and Reviews 77
Tanning Marsupial and Other Skins 79
Good Roads and Rural Development 80
The Influence of Acidity on the Quality of Butter 82
Non-Setting of Fruit—Lessons to be Learned 84
Farm Tractors—Engine Efficiency ... 85
Snails as an Orchard Pest—Control Measures 86

Answers to Corresponents—

Maize as Cattle Fodder 87
Soil Formation 87

Page.

Answers to Correspondents—*continued.*

Corn-Cob Meal 87
Soil and Arsenate of Lead 88
"Jack Bean" 88
Khaki Weed 88
Suspected Poison Plant 88
Needle Burr, A Bad Pest 88
"Gooseberry Cucumber," or "Paddy Melon" 88
Grasses Identified 89
"Potato Bush" 90
The Woods of Albizzia and Pithecolobium 90
Sandalwood 90
A Pernicious Weed—Other Weeds ... 90
"Mexican Clover" 91
"Stork's Bill" or "Crow's Foot" 91
Apples in Central Queensland 91
Blight in Sheep 91
Pig Feeding 92
Broom Millet Seed as Pig Feed ... 92
Molasses as Pig Feed 92

General Notes—

Banana Beetle Borer 93
Egg Board Levy 93
"Stock Foods and Feeding" ... 93
Better Farming—Wheat on Downs—Storage of Fodder 93
Fodder Storage Practice 93
Staff Changes and Appointments ... 94
Downs Wheat Crop—Prospects Encouraging 94
State Government Insurance Office 94
Wheat-growing Competition 94
Starting a Cold Engine 95
The Royal Society of Queensland ... 95
Stallions Registration Act 95
Advertising Queensland 96
Prolonging the Life of a Car 96
Farm and Garden Notes for August ... 97
Orchard Notes for August 98
Plumbing Jobs on the Farm 99
Astronomical Data for Queensland ... 100
Departmental Announcements ... ... XI.

VIMLICK **The Super Quality Medicated Stock Lick**

To feed—Simply spread over the ground

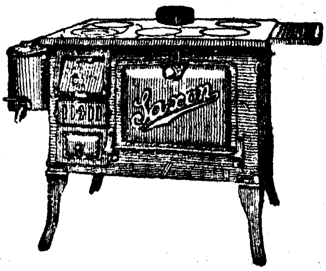
Costs £3 a ton less than any other Stock Salt on the market.

This new stock salt is prepared in small crystal form and contains all the elements necessary for the good conditioning of stock. Salt, Epsom Salts, Sulphate of Iron, Herbs, Lime, Bone Meal, Flowers of Sulphur, and two high-class secret ingredients are used.

Ton or half-ton lots £11 10s. per ton
less than half-ton 20s. per 180 lb. sa

Wholesale Distributing Agents—

SAMUEL ALLEN & SONS,
Brisbane, Townsville, and Cai
THOS. BROWN & SONS, LTD., Rockh
CORSER & COMPANY, LIMITED, Mar



The

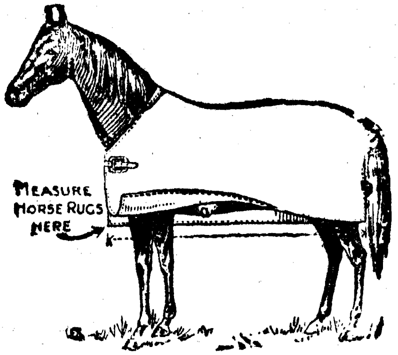
SAXON FUEL STOVE

The Saxon offers the housewife a wonderful investment in Fuel Stove value and fine cooking qualities. It is lined with specially constructed fire bricks which give it exceptionally long life. Different sizes are available with low set or elevated legs, and you can also have enamelled front and every modern labour saving attachment. When you see the Saxon you will approve of it and appreciate its obvious superiority.

Inspect at your Store. If not stocked, write us for Prices and Illustrated "Saxon" folder.

Sachs & Co

Brookes Street
VALLEY, BRISBANE



HORSE RUGS

(All lengths same price)

HORSE RUGS—Heavy Jute, 17s.; Best Navy Canvas, 24s.; Heavy Khaki, 37s. 6d. each.

COLEMAN LAMPS AND LANTERNS—300-candle power, both 65s.; now completely insect-proof.

GALVANISED IRON—Best quality British Crown, 26-gauge, £27 15s.; or, if booked month ahead, £26 15s. per ton.

POWER KEROSENE—Venus, 12s. 6d. per case.

LINSEED OIL—Australian—4-gallon tins—Raw 4s. 9d. and Boiled 4s. 11d. per gallon. B. & S. Imported—in 5-gallon drums—6d. per gallon extra.

WHITELEAD—Champions, Genuine, 18s. per 28-lb. keg; Australian, Special, 14s. per 28-lb. keg.

PAINTS—15s. 6d. and 21s. per gallon. Write for Colour Cards. NOW IS THE SEASON TO PAINT.

ROOM-HEATERS—Kerosene, from 30s. each.

WIRE NETTING, 2-in. by 19-gauge, in 50-yard rolls—
24-in., 8s. 6d.; 30-in., 10s. 3d.; 36-in., 11s. 6d.; 48-in., 15s. 6d.; 60-in., 19s. 6d.; 72-in., 23s.; all less 10 per cent.

LUCERNE SEED—Best Quality Hunter River, 2s. 3d. per lb.; cwt. lots, 2s. 1d.

MOTOR SPIRIT—Venus No. 1—To members, 16s. per case.

NEW BIG DISCOUNT NOW OUT FOR ALL TYRES AND OILS. WRITE FOR IT BEFORE PURCHASING ELSEWHERE.

Venus Power Kerosene—To members, 11s. 9d.

Also Lowest for all GROCERIES—"K" WIRE—CEMENT—BUILDING LINES—FARM MACHINERY—RABBIT TRAPS, ETC.

Write for our new 65-page illustrative catalogue. It will save you pounds.

QUEENSLAND PASTORAL SUPPLIES LTD.

Warehouse and Offices—Bowen street, off Ann street (between Fire Brigade and Ambulance)

BRISBANE 'Phones: 5410 (4 lines)

CONTENTS.

Page

Event and Comment—

Cane Crop Prospects ... 101
The Citizen of To-morrow ... 102
"Queensland and Loyalty—Synonymous Terms" ... 102
The Fuel of the Future—Modern Road Transport ... 102
"This Pacific Eden" ... 103
Tobacco Growing in Queensland ... 103

Bureau of Sugar Experiment Stations—

Cane Pests and Diseases ... 104
Cane Pest Combat and Control ... 108
Cane Beetles and Climate ... 110
Entomological Hints to Canegrowers 114
Red Rot Disease ... 115
Field Reports ... 117
Report on the Fiji Disease Situation in Queensland ... 125
Live Stock and Meat Industry Exhibit—Royal National Show ... 141
Cane-growing and its Problems ... 142
Some Hawaiian Experiments in the Biological Control of Insect Pests 145
The Queensland Agricultural Bank ... 148
The Brennan Butter Box ... 150
Farm Tractors and their Management 151
Citrus Culture—Successful Experiments ... 152
Poultry Raising ... 153
Rainfall in the Agricultural Districts 161
Abstracts and Reviews ... 162
Onion Growing ... 164
Peanut Industry (Illustrations) ... 166
Points in Plant Propagation ... 170
Fluke in Sheep ... 173
Trade Classification of Pigs ... 174
Horse *v.* Tractor ... 186

Answers to Correspondents—

Fertilizing Practice ... 187
Tanning Pelts ... 187
Pig Literature ... 187
Prices and Weights ... 187
Breeds of Pigs ... 188
Creeping Tick Trefoil ... 189
"Castor Oil Bush" (*Adriana acerifolia*) ... 189
Nut Grass ... 189
"Fairy Grasses"—"Love Grasses" 189
Budding of Citrus Trees ... 189
Coffee Culture ... 190

Page.

Answers to Correspondents—*continued.*

Pineapple Culture ... 190
Pineapple Growing ... 190
Valencias—*Passiflora ligularis*—Nuts ... 190

General Notes—

Wheat Board ... 191
Seed for Cotton Growing ... 191
Staff Changes and Appointments ... 191
Fruit Marketing—Sectional Group Committees ... 192
Butter Board Election ... 192
The Folly of Marketing Immature Fruit ... 192
Protecting the Banana Industry ... 192
Proposed Queensland Maize Board 192
Castration of Pigs ... 193
Radio Lectures for Farmers—Policy in Denmark ... 193
A Business Proposition for the Future ... 193
South Burnett Cleansing Area ... 194
Cheese Board ... 194
Swine Fever ... 194
Skin Dealers must be Registered ... 194
The Royal Society of Queensland ... 194
"Australia's Fascinating History" 194
Atherton Tableland Maize Board ... 195
The Supercilious Critic ... 195
False Economy ... 195
A Hen's Best Age ... 195
Magneto Hints ... 195
Always Find the Cause ... 196
Testing Tyre Pressure—A Good Motor Habit ... 196
How to Keep People on the Land ... 196
The "Mystery" of Farming ... 197
The Drift to the "Big Smoke" ... 197
Care of the Cow in Calf ... 197
Sunlight and Sanitation ... 198
Peanut Board Election ... 198
Atherton Tableland Maize Board Election ... 198
New Citrus Varieties ... 198
Farm and Garden Notes for September ... 199
Orchard Notes for September ... 200
Astronomical Data for Queensland ... 202
Departmental Announcements ... XI.

VIMLICK The Super Quality Medicated Stock Lick

To feed—Simply spread over the ground

Costs £3 a ton less than any other Stock Salt on the market.

This new stock salt is prepared in small crystal form and contains all the elements necessary for the good conditioning of stock. Salt, Epsom Salts, Sulphate of Iron, Herbs, Lime, Bone Meal, Flowers of Sulphur, and two high-class secret ingredients are used.

Ton or half-ton lots £11 10s. per ton, less than half-ton 20s. per 180 lb. sack.

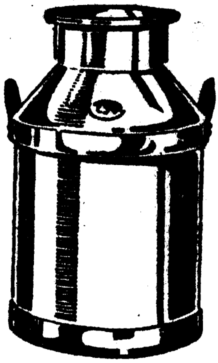
Wholesale Distributing Agents—

SAMUEL ALLEN & SONS, LTD.

BRISBANE, TOWNSVILLE, and CAIRNS

Thos. Brown & Sons, Ltd., Rockhampton

Corser & Company, Limited, Maryborough



Those Old Cream Cans!!

Don't throw them away—Have them re-conditioned and get a few years extra service out of them.

The "Sax" Cream Can RETINNING SERVICE will make those old Cans almost as good as new. All dents are removed, minor repairs effected, after which the Can is completely and thoroughly *re-tinned*. The completed job costs quite a small sum, and, incidentally, will agreeably surprise you by its general excellence and smart appearance.

Tell us the condition your cans are in and we will quote.

WRITE NOW.

E. Sachs & Co.

Brookes St., Valley
BRISBANE

GALV. IRON. GROCERIES.
WIRE. CEMENT. KEROSENE.

And all requirements of the Man on the Land. We supply you direct at wholesale Prices.

Galvanised Iron—26 g. £27 15s., ton basis. If booked to arrive one month ahead, £26 15s.

Wire Netting—36 x 2 x 19. This month 10s. roll of 50 yds.

"K" Wire—We allow 10 per cent. off all makers' lists.

Barb Wire—This month. Special price 20s. per coil (4 coils to the mile).

Cement—25s. per cask. Ton lots 22s. 6d. cask.

Venus Power Kerosene—12s. 6d. per case. To members of Tyre Club—subscription of which is only 1s. per month—11s. 9d. per case.

Venus Motor Spirit—18s. case. To members of Tyre Club, 15s. per case.

Plain Galv. Wire—14 g., over 2,000 yds. to coil, 22s. 6d. per coil of 1 cwt.

Incubators—The famous "Zenith" that holds so many records. We are Sole Agents. Priced, 60 egg £8, 100 egg £9, 140 egg £10.

Cream Cans—Seamless, tinned, best quality. Two gal. 16s. 6d., 3 gal. 17s. 6d., 4 gal. 18s. 6d., 5 gal. 21s., 6 gal. 23s., 8 gal. 25s., 10 gal. 28s. 6d.

All Separators—At wholesale discount.

Cups and Saucers—White and gold, 5s. dozen.

Tractor Oil—Pure Pennslyvania, 5s. 6d. per gal.

Tyres—All makers at wholesale discount. Write for details.

Also lowest for all Fencing Wire; all Groceries, in any quantity; Motor Spirit; Builders' Hardware; Joinery; Farm Implements; Engines; and all that interests the man on the land. Our new 65 page Illustrated Catalogue will save you pounds. It is yours for the asking. Write to-day.

EXHIBITION VISITORS are invited to call. We also will have a space in the building at the Exhibition.

Queensland Pastoral Supplies Ltd.

Warehouse and Offices—Bowen street, off Ann street (between Fire Brigade and Ambulance)

BRISBANE 'Phones: 5410 (4 lines)

CONTENTS.

Page

Event and Comment—

The Governor's Speech 203
Fostering Queensland Industries .. 204
"Undefeatable"—The Queensland Spirit 205
The Queensland Tropics—"Like being in Fairyland" 205

Bureau of Sugar Experiment Stations—

Entomological Hints to Canegrowers 206
Top Rot in Sugar Cane 208
Cane Pest Combat and Control .. 211
Cane Pests and Diseases 216
Field Reports 221
The Cotton Industry—Taking Stock 228
Some Notes on Cutworms in Cotton .. 229
The Cutworm Menace 232
Rainfall in the Agricultural Districts 233
Royal National Exhibition 235
Care of the Farm Team 289
The Meat Industry 291
Mr. James A. Heading 302
Pigs at the Brisbane Show 303
Dipping Device 308
Cotton Growing in 1860 309
Sheep on the Atherton Tablelands .. 310
The Forest Estate 312
Australian Tobacco Investigation .. 316
Facts About Food Values 317
Repairing Wood Fences 319

General Notes—

Arrowroot Board 320
Queensland Cane Growers' Council 320
Egg Board Levy 320

Page.

General Notes—*continued.*

Atherton Tableland Maize Board 320
Broom Millet, Peanut, Cotton, and Egg Boards 320
Cane Levy, Maryborough District 320
The Diabolo Separator 320
Influences of an Agricultural Life 320
Mackay Sugar Levies 321
Levies by Sugar Mill Suppliers' Committees 321
Wheat Board Election 321
Proposed Honey Pool 321
Proposed Queensland Maize Board 322
The Royal Society of Queensland 322
Fish and Mosquito Control .. 323
Staff Changes and Appointments .. 323
Sugar Mill Suppliers' Committees 324
Sugar Mill Suppliers' Committees—Regulation Rescinded 324
Sugar Levies 324
Banana Plant Prohibition Applied to Goomboorian 325
The Three D's. 325
Butter Board Election 325
Erection and Care of Farm Buildings 325
Cheese Board Election 326
Safety in Silage 326

Answers to Correspondents—

Mangroves 327
Specimens Identified 327
Farm and Garden Notes for October 327
Orchard Notes for October 328
Astronomical Data for Queensland .. 330
Departmental Announcements .. xi.

VIMLICK The Super Quality Medicated Stock Lick

To feed—Simply spread over the ground

This new stock salt is prepared in small crystal form and contains all the elements necessary for the good conditioning of stock. Salt, Epsom Salts, Sulphate of Iron, Herbs, Lime, Bone Meal, Flowers of Sulphur and two high-class secret ingredients are used.

Ton or half-ton lots £11 10s. per ton, less than half-ton 20s. per 180 lb. sack.

Wholesale Distributing Agents—

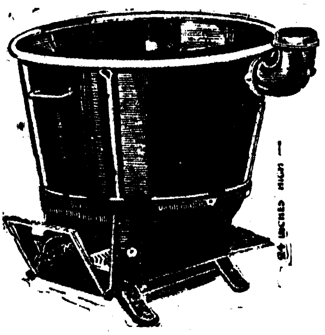
SAMUEL ALLEN & SONS, LTD.

BRISBANE, TOWNSVILLE, and CAIRNS

Thos. Brown & Sons, Ltd., Rockhampton
Corser & Company, Limited, Maryborough
Messrs. Campbell & Amos, Ltd., Bundaberg

"£3 ton less than other Licks. Why pay more"

A Modern Convenience



NOVO

The Wonder Boiler Stand

Only 24 inches high; 2-door firebox; takes any length of wood; boils very quickly with minimum fuel; no lifting; no stooping—these are just a few of the improved features of the NOVO, the best and cheapest Boiler Stand on the market. You want a NOVO—it will pay you to refuse substitutes.

See the Novo at your store. If not stocked, write us direct for prices & particulars

E. Sachs & Co. Ltd.

Brookes Street
VALLEY, BRISBANE

Buy your Station Supplies Direct

Galvanised Wire—8 g. galvanised wire, £16 10s. ton, or 17s. 6d. cwt.; 10 g. galvanised wire, £18 ton, or 19s. 6d. cwt.; 12½ high tension 850 lb., £20 ton, or 21s. cwt.; 12½ high tension 1,140 lb., £24 ton, or 25s. cwt.; Hibiscus tested, £27 10s. ton, or 29s. cwt.

Tea—From 1s. 6d. lb.

Sugar—£27 10s. ton, 24s. 3d. bag.

Flour—£15 10s. ton, 24s. 3d. bag.

Kerosene—12s. 6d. case.

ALL GROCERIES AT WHOLESALE RATES.

Galvanised Iron—26 g., £26 15s. ton; 24 g., 30s. ton less.

New Wheat Bags—11s. 9d. dozen. Bale lots 11s. 3d.

Latest Lock Link Chain Fencing—At "K" wire prices. Write for List.

Wire Netting—36 x 2 x 19—50-yard rolls, 10s. coil. All other sizes at bedrock.

Horse Rugs—20 per cent. off our usual prices for this month.

Strychnine—3s. 6d. oz.

Lime—Agricultural, 4s. bag; builders', 5s. 6d. bag.

Cement—25s. cask; ton lots, 22s. 6d. cask; bag, 7s. 6d.

Seament Paint—For wooden buildings, iron roofs, and tanks. Highest quality. Write for special pamphlet. Supplied to Government after exhaustive tests for endurance. Red, 20s. gallon; colours, 27s. gallon.

Also lowest for Linseed Oil, Whitelead, Motor Spirit, Oils, Tyres, Pumps, Piping, Builders' Lines, Joinery, etc. Write to-day for our 65-page Illustrated Catalogue. It will save you pounds.

Queensland Pastoral Supplies Ltd.

Bowen street (off Ann street, between Fire Brigade and Ambulance),
BRISBANE 'Phones: 5410 (4 lines)

CONTENTS.

Page.

Event and Comment—

The Dairying Industry—Its Value to the State ... 331
Assisting the Man on the Land ... 332
"Queensland's Best is Equal to the World's Best ... 332
Dairying Economics ... 332
The Fine Discipline of the A.I.F.—A Tribute to Australians ... 333
Produce the Very Best—The Need of Technical Efficiency ... 333

Bureau of Sugar Experiment Stations—

Cane Pests and Diseases ... 334
Cane Pest Combat and Control ... 339
Entomological Hints to Canegrowers 341
Field Reports ... 343
Records of Australian Thysanoptera (Thrips) ... 348
Farm Tractors ... 353
Vinca rosea—A Reputed Cure for Diabetes ... 355
Crate Packing of Bananas ... 356
Bananas in the North ... 357
British Breeds of Live Stock ... 358
Contagious Mammitis in Cattle ... 360
Rainfall in the Agricultural Districts ... 361
Milk in the Home ... 366
The Problem of the Tuberculous Cow ... 372
The Problems of the Motorist ... 375
The Empire Marketing Board ... 376
List of Registered Stallions ... 377
Queensland Production ... 394
Pig Club Progress ... 397
Queensland Overseas ... 406
Rural Fires ... 407
Lemons ... 410
Prize-winning Queensland Butter ... 411
The Artificial Colouring of Citrus Fruits ... 411
An Improved Wire Gate ... 412

Answers to Correspondents—

A Tourist's Criticism ... 413
Analysis of Bush Hay ... 413
Wowan Soils ... 413
Wood Ashes as Fertiliser ... 414
Eucalyptus Baileyana ... 414
Plants from South Burnett ... 414
Canavalia obtusifolia ... 414

Page.

Answers to Correspondents—*continued.*

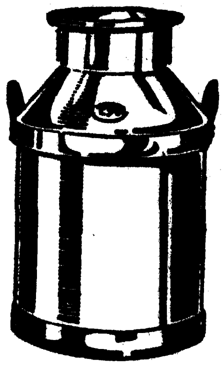
The Common Mallow—Its Stock Food Value ... 414
Aquatic Plants in the Brisbane District 415
Phaseolus semierectus ... 415
Pepper Cress or "Mustard Weed" ... 415
Woolly Burr Trefoil ... 415
Lung Worms in Sheep ... 416
Salted Sheep Food ... 416
Feeding of Pigs ... 417
Pig Raising in Australia ... 417
Concrete Gate Entrance ... 418
The Methylene Blue Test and Curd Test 419

General Notes—

Identification of Stock ... 421
Arrowroot Board ... 421
Banana Levy Regulations ... 421
Staff Changes and Appointments ... 421
Levies under the Marketing Act ... 421
Sanctuaries under Animals and Birds Acts ... 422
Peanut Board Election ... 422
Wheat Board Election ... 422
Atherton Tableland Maize Board Election ... 422
Furniture from Queensland Timbers 423
How the Public Curator Serves the People ... 423
Oil Prospects ... 424
The Value of Wheat Breeding ... 424
Distinguished Visitors' Pleasant Memories of Queensland ... 424
Royal Society of Queensland ... 425
Manurial Trials with Broom Millet ... 425
Gidyea for Sheep ... 426
Increasing Milk Production ... 426
Fertiliser Trial with Tomatoes ... 426

The Home and the Garden—

Jam and Jelly Making ... 427
Story of the Garden ... 429
Bougainvillea ... 432
Dracæna ... 432
Farm Notes for November ... 433
Orchard Notes for November ... 433
One-man Saw ... 435
Astronomical Data for Queensland ... 436
Departmental Announcements ... xi.



"SAX"
Seamless
Cream
Cans

The best can your money can buy. All parts are oxy-welded—no rivets used. The "Sax" can is made from finest quality steel sheets and will stand up to an unusual amount of rough usage. These cans are made in all sizes and—they cost no more than ordinary everyday cream cans. Inspect "Sax" cans at your Factory or Store. If not stocked, write us direct.

Re-tinning
Cream Cans

We make a fine job of re-tinning old cream cans. We also remove dents and effect minor repairs. Why not send us those old cans and have them made equal to new?

Inquiries invited.

E. Sachs & Co. Ltd.

Brookes St., Valley
BRISBANE

BUY WHOLESALE
and save Middleman's Profits

We supply all your wants direct, including — ALL GROCERIES

For full list ask for our general Catalogue. Post free.

Fencing Wire—We are the largest distributors in Queensland:—8 g. galvanised, £16 10s. ton, or 17s. 6d. cwt.; 12½ g. high tensile, 1,480 yds. to the coil, from 21s. cwt. Sole Agents for the **Hibiscus High Tension Wire**—12½ g., £27 10s. ton, or 29s. cwt.—same strength as 8 g. ordinary—won't sag. Barb Wire—from 25s. coil.

Galvanised Iron—26 g.—Best British Crown —£26 15s. ton, or by the sheet: 5 ft., 2s. 6d.; 6 ft., 3s.; 7 ft., 3s. 5d.; 8 ft., 4s.; 9 ft., 4s. 7d.; 10 ft., 5s. 1d.

" K " Wire—We are the only firm in Brisbane that supplies you direct and allows you 20 per cent. off maker's prices.

Cream Cans—Best quality, seamless. Two gal., 21s. 6d.; 3 gal., 22s. 6d.; 4 gal., 24s. 6d.; 5 gal., 28s. 6d.; 6 gal., 30s. 6d.; 8 gal., 33s. 6d.; 10 gal., 35s. 6d.; less 10 per cent.

Separators—The **Hibiscus.** The highest quality—as Sole Agents for the factory none can equal our prices—we allow you 10 per cent. discount on month's free trial. Write for catalogue. Sizes—No. 00, £5; No. 0, £7 7s.; No. 1, £9 10s.; No. 1½, £10; No. 1½ disc, £10 7s. 6d.; No. 2, £17 5s.; No. 3, £28 15s.; No. 4, £40; No. 4 disc, £43.

Also lowest for Cement, Wire Netting, Dog Traps, Wheat Bags, Motor Spirit, Kerosene, Tyres, and Oils. Write for our Catalogue to-day.

Queensland Pastoral Supplies Ltd.

Bowen street (off Ann street, between Fire Brigade and Ambulance),
BRISBANE 'Phones: 5410 (4 lines)

CONTENTS.

Page.

Event and Comment—

- Dairying in Australia—Queensland's Prominence ... 437
- Farming and Grazing—Their Interdependence ... 438
- Cotton Growing in Queensland—An Adaptable Crop ... 438
- The Cold Logic of Economical Conditions ... 438
- The Stability of Agriculture ... 439
- Advertisement of Adversity—"Bad Business" ... 439
- The Journal ... 439
- An Agricultural Survey ... 439

Bureau of Sugar, Experiment Stations—

- Uba Cane ... 440
- Hints on Entomology to Canegrowers 442
- Cane Pests and Diseases ... 443
- Field Reports ... 449

Notes on the Breeding of Certain Fruit Flies in Captivity ... 451

Protection of Native Fauna ... 452

Irish Blight of Tomatoes ... 453

Cotton Crop Prospects ... 456

Coccidiosis of Chickens ... 457

Rainfall in the Agricultural Districts ... 458

Cotton Growing in Queensland—Part I. 459

Brush Sledge ... 485

An Automatic Gate ... 486

The Farmer and His Market ... 489

Live Stock in Queensland ... 495

Farm Tractors and Their Management 496

The Late James A. Robertson ... 497

Wheat Crop Prospects ... 497

Wheat Crop Competition ... 498

Self-Feeders for Pigs ... 499

Paralysis of the Hindquarters in Pigs ... 505

Gros Michel Bananas ... 521

Publications Received ... 522

Citrus Fruit in the West ... 525

Answers to Correspondents—

- Destruction of Weeds in Banana Gardens ... 526
- Bone Crushing ... 526
- Tea Trees ... 526
- Plants from Yarraman Identified ... 526
- Yellow Pea (*Cassia notabiles*) ... 527
- Dogwood—Snake Weed—Rush Lily—Bitter Bark ... 527
- The Tea Plant ... 527
- *Side corrugata* — "Bindey-eye" — Cochineal Infested Pear ... 527
- Sheep Fattening ... 527
- Castration Risks ... 528
- Paralysis in Pigs ... 528

Sectional Swinging Door ... 528

General Notes—

- Hail Insurance ... 529
- Staff Changes and Appointments ... 529

Page.

General Notes—*continued.*

- Egg Board Election ... 529
- North Queensland a White Man's Land ... 530
- More Sanctuaries Proclaimed ... 530
- Central Sugar Cane Prices Board ... 530
- Crate Packing of Bananas—A Correction ... 530
- Queensland Butter at Islington—Warwick Wins ... 530
- Bird and Animal Sanctuaries ... 531
- Rural Schools—Training Brains and Hands ... 531
- 4QG and the Farmer ... 531
- Fur Farming in Canada ... 531
- Cheese Board ... 532
- Amended Cheese Selling Rule ... 532
- Northern Pig Boards ... 532
- Milk as a Food ... 532
- Swat that Fly ... 533
- Electric Lighting on the Farm ... 533
- New Zealand to Can Butter ... 534
- Essentials in Dairying ... 534
- The Royal Society of Queensland ... 534
- Value of Orange Juice ... 535
- Shade Trees—Their Economic Value 535
- Dirty Fallows—Work for Summer ... 535
- Production Costs in Terms of Time ... 536
- Agricultural Education in the United States ... 536
- Concentrates—Price Not Always Index of Value ... 537
- Co-operative Development in the United States ... 537
- Seeking a Substitute for Petrol ... 537
- An Effective Mouse Poison ... 537
- Market Good Crops through Good Cows ... 538
- An Appeal for Thrift ... 538
- Encourage Home Manufactures ... 538
- Land Values ... 538
- Do the Job Properly! ... 538
- Our Social Obligations ... 538
- Fodder Sorghum ... 539
- Beekeeping as a Farm Side Line ... 540
- Varieties for Cross-Pollination ... 541
- The Reserve Power of the Horse ... 541
- The Constitution of the Dairy Cow ... 541
- Practical Co-operation ... 541
- Improvement of Dairy Cattle in Irish Free State ... 542
- Silage as an Insurance ... 542
- Green Feed Values ... 542
- Marketing School for Farmers... ... 542

The Home and the Garden—

- The Cooking of Meats ... 543
- The King's "Plum Duff" ... 545
- Manuring Roses ... 545
- Bonemeal for the Lawn ... 545
- The Manure Heap ... 545
- House Ashes ... 546
- The Cultivation of the Gerbera ... 546
- Kitchen Garden ... 546
- Flower Garden ... 546

Orchard Notes for December ... 547

Farm Notes for December ... 548

Astronomical Data ... 550

Departmental Announcements ... xi.

And—

if you want the best value for your money you'll certainly be well advised to specify :—

"SAX" Seamless Cream Cans

No rivets—no holes drilled. All parts are oxy-welded. Only the best sheet steel is used in these cans, and they are heavily tinned after manufacture. For appearance, durability, and economy, you cannot do better than buy "Sax" Seamless Cream Cans.

"Sax" Seamless Cream Cans cost no more than the old style article.

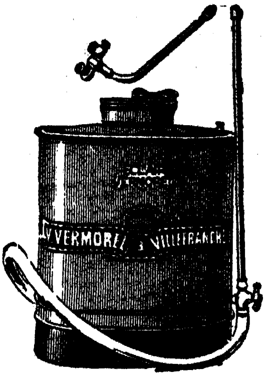
SIZES:

2, 3, 4, 5, 6, 8, 10 galls.

If unable to procure "Sax" Seamless Cream Cans at your local factory or store, mail your order direct to us. You'll find it well worth while to insist on these quality Cans.

E. Sachs & Co. Ltd.

Brookes St., Valley
BRISBANE



Big Saving in

Spray-Pumps, Separators, Tarpaulins, etc.

We Cut Our Prices Fine Enough for Wire and Netting as you Know—The Same Applies to all Our Lines Throughout.

Look at the "Vermorel" Eclair No. 1— Copper Automatic Knapsack Spray Pump. Others sell similar pump £5. Our price, complete, 75s.

Hibiscus Double Acting Brass Bucket Spray Pump—Others sell 35s., our price 27s. 6d.

Separators—As Sole Agents for the Hibiscus Factory, we allow Factory Prices—less 10 per cent. Write for prices and details—month's free trial if desired.

Tarpaulins—All Sizes—sample on request—prices very low.

WIRE AND NETTING.

Being Without Exception the Largest Importers in the Whole of Australia Our Prices Must be Right. Refer to Catalogue.

New Wheat Bags—11s. 3d. bale lots. Open stock, 11s. 9d. per dozen.

A Few Other Lines—Galvanised Iron, 26 g., £26 15s.; **Sugar,** 24s. 3d. bag, £37 10s. ton; **Defence Meat Safe,** 14s.; **Cement,** 22s. 6d. cask; **Paint,** 15s. gallon; **Whitelead,** 13s. 6d. keg; **Linseed Oil,** 4s. 7d. gallon.

Also Lowest for Water Bags, Cold Safes, "K" Wire, Bedsteads, Tyres, Oil, Kerosene, Stoves, Ranges, &c. Catalogue Posted Free.

Queensland Pastoral Supplies Ltd.

Bowen street (off Ann street, between Fire Brigade and Ambulance),
BRISBANE 'Phones: 5410 (4 lines).

CONTENTS.

Page.

Event and Comment—

- The Wheat Yield—Record Bushel Weights—Estimate Exceeded ... 551
- Queensland at Work—A Picture of the Tropical North ... 552
- The Romance of Queensland ... 552
- The Finger Cherry Causes Total Blindness—A Warning ... 553
- An American Looks at Australia ... 553
- Primary Produce Experiment Stations 553

Bureau of Sugar Experiment Stations—

- The Season's Sugar Production ... 554
- Entomological Advice to Canegrowers 554
- Cane Boring Insects ... 555
- Cane Pest Combat and Control ... 556
- Cane Pests and Diseases ... 558
- Grubs for "Grub" ... 565
- Field Reports ... 568

A Temporary Drill ... 577

Root Knot or Nematode Root Gall ... 578

The Corn Ear Worm on Tomatoes ... 585

Cotton Growing in Queensland—Part II. 589

Primary Produce Experiment Stations 615

Green Manuring ... 620

Rural Routes in Queensland ... 622

An Automatic Gate ... 630

Rainfall in the Agricultural Districts ... 632

Some External Parasites of Poultry ... 633

Tyre Life—How to Prolong It ... 639

Enthusiasts in Pig Raising ... 640

A Ton of Pork in Six months from One Litter ... 644

Maize Improvement ... 652

Farm Tractors ... 656

Comparative Potato Trials in the North 657

Fertiliser Experiments with Peanuts ... 658

Wheat Improvement ... 659

Paspalum Pasture Renovation ... 661

Page

Answers to Correspondents—

- Sensitive Plant ... 665
- The Use of Sulphate of Iron ... 665
- Weeds on Lawn and Garden Paths ... 665
- Native Quinine ... 665
- *Erythræa australis—Monstera deliciosa* 665
- Nut Grass ... 665
- "Red Head" or "Red Cotton Bush" 666
- Paralysis in Pigs ... 666
- Sick Pigs ... 666
- Making Pigs Pay ... 666

General Notes—

- Staff Changes and Appointments ... 668

The Armistice Anniversary ... 668

- Marketing Tomatoes ... 668
- Canary Seed Board ... 669
- Obituary ... 669
- The Quality of Queensland Bananas—Activities of "Geographical Protectionists" ... 669
- Scientists Needed ... 669
- Northern Pig Board ... 670
- The Dutch Egg Industry ... 670
- Experimental Consignment of Australian Oranges ... 670
- The Royal Society of Queensland—Abstract of Proceedings ... 670
- Central Cane Prices Board ... 671
- Tropical Fruits ... 671
- The Celotex Industry—Its Potential Importance to Queensland ... 671
- Feeding Tests on Dairy Cows ... 672

The Home and the Garden—

- The Baby—Its Care and Feeding ... 673
- Kitchen Garden ... 675
- Flower Garden ... 675

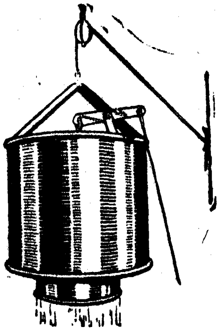
Orchard Notes for January ... 676

Farm Notes for January ... 678

Astronomical Data ... 680

Departmental Announcements ... XI.

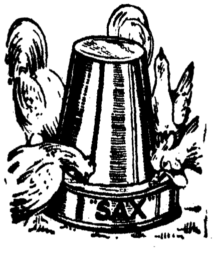
Two
—Inexpensive
—Summertime
—Necessities



THE "SAX" PORTABLE SHOWER

Can be erected anywhere. Very simple, easy to erect, and provides a really excellent shower.

4 sizes:
12/-, 13/-, 14/-, & 16/-
Pulley and cord extra



POULTRY FOUNTAIN

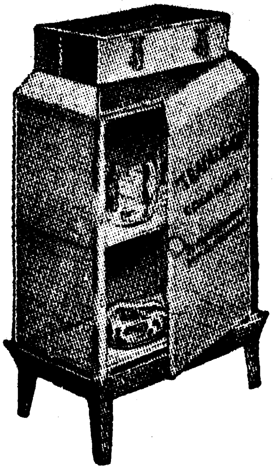
Automatic in action—keeps water cool and fresh, only needs filling occasionally. 1, 2, 3, and 4 quarts.

PRICES:
1/9, 2/-, 2/3, 2/6

If not stocked locally order direct from us.

E. Sachs & Co. Ltd.

Brookes St., Valley
BRISBANE



THE TRAFALGAR COLD SAFE

It keeps food cool in the hottest weather. Meat and Fruit are preserved by its action. Milk and Cream retain their freshness. Jellies and such hot-weather trifles—so difficult to prepare when no ice is available—become enticing and palatable when placed in the safe. It is absolutely FLY and ANT PROOF.

Size inside—

16 in. x 16 in. x 13 in. ..	£3	15	0
21 in x 18½ in. x 14 in. ..	£4	7	6
24½ in. x 20 in. x 16½ in. ..	£5	5	0
27 in x 23 in. x 18 in. ..	£6	7	6

Larger sizes if desired.

All prices less 10 per cent. discount direct to you.

Every Safe guaranteed or money back.

KITCHENWARE AND SPECIAL XMAS CATALOGUE

Now ready. All lines keenly priced—write for them to-day. Our general Catalogue, including all **Groceries, Galvanised Iron, Wire and Netting, Paints, Stoves, Ranges, Kerosene, Oils, &c.,** also posted you on request.

WE SUPPLY YOU DIRECT.

Queensland Pastoral Supplies Ltd.

Bowen street (off Ann street, between Fire Brigade and Ambulance),
BRISBANE 'Phones: 5410 (4 lines).

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. 1 JULY, 1927. PART 1.

Event and Comment.

Queensland's New Governor.

BRISBANE as the gateway of the State, in its superb scenic setting and touched with the gold of a winter sunrise, looked its best on 13th June, the day of the arrival of the new Governor of Queensland. Coming up its beautiful river on a majestic Orient liner a myriad windows of homes rising to the heights from the waters edge, reflecting the morning sunlight, had already flashed a smiling welcome to Sir John and Lady Goodwin—a welcome to be expressed more warmly by the citizens themselves before the day had far advanced. The Acting Premier, Mr. A. J. Jones and Mrs. Jones were the first to offer greetings to His Excellency and Lady Goodwin on behalf of the people of Queensland. At a civic reception later in the week, at which were gathered representatives of every section of the community, the cordiality of the people's welcome was again demonstrated felicitiously. The Acting Premier (Mr. A. J. Jones), supported by other prominent representatives of the people, renewed the State's greetings. The high office of Governor, he said, had always commanded the respect of the people of Queensland. Apart from that, Sir John Goodwin came from overseas with a great reputation, and on that account alone could be assured of the goodwill and esteem of the people. He was sure His Excellency would be impressed by the wealth and prospects of Queensland. He had come here to help the citizens of the State to work out their destinies, and to surmount their difficulties, and he would carry away with him a favourable impression of the country. The disabilities of Queensland's climate were much exaggerated in the Old Country, and he could assure His Excellency

and Lady Goodwin that if there was one thing that could exceed the warmth of Queensland's climate, it would be the warmth of the welcome extended to them by its people.

The Lieutenant-Governor (Mr. W. Lennon), the Mayor of the City (Alderman W. A. Jolly), Colonel Donald Cameron, D.S.O., M.P., and Sir David Hardie joined in the citizens' greetings which were accorded so cordially.

In the course of his acknowledgment, his Excellency said that the welcome received by Lady Goodwin and himself had been overwhelming, and made him feel that his dearest wish had been realised—namely, that he should not come to Queensland as a stranger. He loved Australia, and could claim that the better part of him was Australian. For the fact that his earliest recollections were of Victoria and not of Queensland, they would have to remember his extreme youth at the time, and so forgive him. For the greater part of his life he had been in the service of the State, and so had not been able to revisit Australia as he would have liked to do. When he was offered the post of Governor of Queensland, he felt it was a very great honour. He knew a good deal about Queensland, though he had never visited it before, and he was satisfied that no country had greater potentialities, or greater agricultural and mineral resources than had Queensland. Then he knew the record of the Queenslanders in the war. It was his great regret that he had never, during the war, come directly into contact with the Australians overseas, but every one with whom he had spoken, including officers who had served with them—told him of the sterling qualities of the men from Australia. It made him proud to be able to claim kinship with such people. If the loyalty of Queensland could ever have been questioned, the record of the State during the war was the most effective reply. From its small population the State had sent 58,000 soldiers overseas to serve the Empire. He was glad that he would henceforth have the opportunity of working with the people of Queensland for the good of the State.

Our Rich North.

WHILE in Melbourne attending the Premiers' Conference recently, the Deputy Premier (Mr. W. Forgan Smith) took an opportunity, in the course of Press interviews, of dispelling some of the extraordinary illusions about Queensland that have existed in the minds of many untravelled southerners. The following points are taken from the report of an illuminating interview with the Deputy Premier that was given great prominence in the Melbourne Press:—

Queensland, he stated, is the one State whose capital is not an octopus, which claws at the vitals of the country. It is the most decentralised State of all. The drift from the land does not exist as it does in the South.

Because the country population dominates, the Government is a country Government.

Because of its wealth and its position, and even because of its problems, Queensland is the most important State in the Commonwealth.

Queensland is getting its best immigrants from the other States. It is attracting farmers' sons from New South Wales, Victoria, and South Australia. Young men are going there because it is there that they get the biggest chances.

Who has heard that more sugar to the ton comes from Queensland cane than from any in the world? This is mainly through the work of the Bureau of Sugar Experiment Stations, which has a corps of keen young scientists working the year round.

Nobody hears much about the Prickly-pear Commission. But every year it is reclaiming thousands of acres of the best land in the North.

Celotex manufacture and power alcohol extraction are promising to become valuable new industries.

When the whole of the sugar-cane residues are being used they will be supplying 8 per cent. of Australia's motor spirit.

Queensland is seriously considering migration. The Dawson Valley scheme will be one of the biggest things it has ever tackled. It is the development and opening of the Dawson Valley for irrigation farms and dry farm areas. The area suitable for irrigated farms is 1,000,000 acres, to which will be attached 200,000 acres of dry lands. About 7,000 new irrigated farms are included in the project, each a living area for an average family of five persons, producing cotton, rice, tobacco, and lucerne. When completed a great dam—to be known as the Nathan

Dam as a compliment to the late Governor of Queensland (Sir Matthew Nathan), who took a deep interest in the scheme—will impound sufficient water to supply Brisbane for more than fifty years without any rainfall during that period. One hundred and thirty square miles of country will be submerged. The scheme provides for five distinct zones of from 40,000 to 50,000 acres, each with its own township. The first of these, the Theodore zone, was opened for selection recently.

A White Man's Country.

DISCUSSING the effects of the recent Royal Mission to Australia, the Agent-General for Queensland in London (Hon. J. Huxham), remarked that the people of England are apt to conclude that the value of the tour of the Duke and Duchess of York is the effect on Australia. Actually it is the effect on England. Australian loyalty needs no stimulus. Previous Royal tours quickened English interest in Australia, which, purely and simply, is a white man's country. It welcomes, he said, the right sort of English migrants with open arms. The great welcome accorded the Duke and Duchess is the measure of Australia's appreciation. It was especially delighted with the Duchess, because she is a woman's woman. It will be splendid, he added, if the visit encourages more Englishmen to migrate to Australia, but they must not arrive in a patronising spirit. Australians, a proud people, have something to teach as well as to learn.

The Problems of the Dairying Industry.

A VISITING American dairying expert, Professor O. F. Hunziker, reviewed most interestingly some dairying problems and points in factory practice at a session of the recent conference of butter and cheese factory managers in Brisbane. He said that the longer he was in Australia the more he became convinced that the fundamental problems of the industry, particularly those of manufacturing, were very similar to those in America. Poor quality cream was the curse of the industry, and the more butter-makers had of it the worse they were off. It was their duty to see that they obtained good cream.

Speaking on the general aspects of butter manufacture, the professor said that he had reached the point where he did not consider anything impossible until it had absolutely been proved, no matter how unreasonable it might sound or appear. For instance, scientists had laughed at the farmer who insisted upon consulting the calendar, and who insisted that planting into the new moon produced bigger crops. Only recently scientists found that the farmer had been right. The first problem was that of ensuring a volume of good cream. He drew attention to the need for greater co-operation between the factories, and said that the lack of co-operation was the rock upon which their efforts towards cream improvement had been wrecked. They should say that cream of a stated quality would receive a certain price. The only reason that poor cream arrived with such exasperating regularity was because they offered the farmer a good market for the poor product. In this respect they were favoured in Australia by legislative assistance in grading and by the maintenance of a price schedule.

But quality and quantity were not the only factors. It was necessary to help the farmer to produce his cream economically. The farmer needed information on feeding, on the proper crops and how to grow them, on the management of cows, and on breeding, although feeding was often more important than selection and breeding. The final matter was that of markets, which should be profitable and permanent. In Australia—like America—they had a high standard of living and high production costs, so that the great essential was that they should produce butter of the highest quality, butter that would command the esteem and the highest price on the world's market.

Australia had relatively a tremendous butter production in comparison with its 6,000,000 population, but the farmers had to depend upon the world's market despite the efforts made to stabilise prices. Hence it was essential to produce the highest quality to secure every penny the world's market would give.

Professor Hunziker elaborated and aptly illustrated the interdependence of the four factors in butter quality—cream quality, methods of manufacture, factory equipment, and supervision or management in the factory.

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Purpose of Entomological Hints.

The first of this monthly series of entomolgical notes of advice tendered to canegrowers was published in November, 1923, and since that date these hints regarding the identification of common insect pests of sugar-cane, their probable times of occurrence, and approved methods for controlling their activities, have appeared regularly month by month in the "Queensland Agricultural Journal," "Australian Sugar Journal," and other periodicals.

The original purpose of the writer was to remind farmers of their responsibilities in connection with taking measures to fight insects likely to affect their crops.

Concerted action undertaken at the right time will go far towards minimising the extent of injuries inflicted by our more serious cane pests; and whilst not unduly trespassing upon daily work on a cane farm would tend also to benefit growers financially.

It should be borne in mind that these monthly hints apply mainly to an area of land lying within a radius of about 25 miles from Meringa Experiment Station, although primary insect pests occurring in other sugar-growing districts (such as Burdekin and Herbert River) are also included at times.

Growers desiring additional information on any point concerning the destruction of cane pests should consult the Entomologist in Charge at Meringa Laboratory; either by 'phone, or letter addressed Meringa, Private Bag, Cairns.

How to Combat Grasshoppers.

About the middle of last month (June) the common grasshoppers *Locusta danica* and *L. australis* were much in evidence in cane fields around Meringa, where later on in the month myriads of tiny hoppers appeared, these being the early larval stage of such pests.

Seeing that conditions still point to a possibility of trouble from these insects in the near future, and probably also in the present month (July), it is advisable to stress the importance of being ready to take action in the event of a sudden attack.

These insects strip the leaf blades, leaving only the mid ribs—the damage, however, being usually confined to small areas—and if taken in time not difficult to cope with.

A bait that has proved successful is made from 100 lb. of coarse bran (the coarser the better) with 4 lb. of finely-powdered Paris green, 4 lb. of cheap-grade granular dairy salt, 2 gallons of low-grade molasses, 3 oz. of amyl acetate, with 10 to 12 U.S. gallons of water; sawdust may be substituted for the bran should the latter prove unobtainable. When large amounts of this bait are being used the arsenic should be added to the liquid ingredients, instead of being mixed with the bran while dry.

For other simple and effective remedies see Hints for May ("Queensland Agricultural Journal," Vol. xxvii., p. 400; or "Australian Sugar Journal," Vol. xix., p. 118).

Remember that Like Produces Like.

Always select good healthy seed, rejecting any sets showing tunnels of the Weevil Borer (*Rhabdocnemis obscurus* Boisd.), or which may have been derived from localities known to be badly infested by this cane-beetle.

Such seed, although apparently fairly clean-looking, often harbours young larvæ, and a few weeks after planting same the latter may devour a sufficient amount of an affected set to endanger or lead to death of the young shoots later on, thus causing unsightly misses. Moreover, it is by means of such infested seed cane that these weevil borers often obtain a footing in clean localities, and once well established this pest is not easily got rid of. Apart from the danger of introducing insect pests, it always pays to use healthy cane for planting; and to see that it be free from fungus diseases. When cutting sets throw aside those showing reddish or other discoloration at the cut ends.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (10th June, 1927) from the Assistant Pathologist, Mr. E. J. F. Wood, on diseases in the Mackay district, for May.

As regards disease, the Mackay district is the least affected of any visited this year, and great credit is due to the farming community which has made it so. It must be remembered that to keep up the standard of efficiency, the efforts at disease control must not be relaxed.

Only two of the major diseases are of importance in this area—viz., Mosaic and Leaf stripe. Gum has been seen in a small area to a very limited extent, and the farmers should endeavour to ascertain the leaf symptoms, which consist of a yellow streak running along the leaf, the presence of red dots in the discoloured areas, and the subsequent death of patches within the leaf being characteristic signs. Very similar signs resulting from damage to the mid-rib of the leaf by the leaf borer, which can be readily detected as a reddish patch showing a sinuous tube beneath the surface, can be mistaken for gum streaks; but the absence of borer and the appearance of the streaks on several successive leaves serve to distinguish gum.

Leaf stripe seems also to be very limited in its distribution and the immediate eradication of the diseased stools is the control measure. These stools should be burnt, and none such should ever be planted. The leaf markings of this disease are rather similar to Mosaic, but the stripes are more definite in outline, and they gradually turn brown. On the lower (dorsal) surface of the leaves a fine white felt may be seen, if closely looked for. The affected sticks are usually elongated, and the leaves often become ribboned, whence the name Leaf Splitting Disease often bestowed on this trouble.

Mosaic is, as usual, more widely distributed than any other disease, but even this is comparatively slight except in the Farleigh and Mount Jukes areas, and is only severe in portions of these. Many farmers do not know the symptoms, but the usual method of rejecting plants which show any peculiar symptoms is to a large extent responsible for the cleanliness of this area. Several farmers have shown me such rejects and asked me what the trouble was. Only their prompt action has prevented the spread of the disease. While it is possible to keep unknown diseases in check in this manner it is always better to know the diseases, and farmers are advised to find out from their friends the symptoms of Mosaic, if they do not already know them. That most characteristic of Mosaic is a mottling of the leaf which shows patches of light and dark green, or of green and yellowish green patches according to the variety. They are just as though one had painted a leaf with a brush dipped at random in two different shades of green, painting along the leaf. The stem is often mottled and in severe cases ribbed.

Part of the freedom from this disease in this area is perhaps due to the fact that very little corn is grown on the cane farms in Mackay, in contrast with the extent of this practice in the southern and more infested areas.

All stools showing the leaf markings should be dug out in cases of light infection, and no infected stool should, under any circumstances, be planted. In both the Mount Jukes and Farleigh areas I should recommend the discontinuation of the planting of Black Innis, as this cane is one of the most highly susceptible varieties grown. Its replacement by Badila or Q. 813 where suitable, and by E.K. 28 on the hillsides, is suggested. The latter variety is rather susceptible to the disease, so rigorous selection is necessary in the case of this variety, but it would be a pity to discard this otherwise eminently suitable variety on this account, as it gives splendid results on the higher ground where so few varieties will grow well.

The greatest efforts should be made to keep the new areas at Carmila and Flaggy Rock free of the disease. A very light infection was noticed at one farm in the latter district, but the farmer seemed to have it well under control, and it is hoped that it will be quickly stamped out.

Attention of the farmers is called to the prevalence of root diseases in the whole area. While these are usually regarded as minor troubles they can collectively cause considerable loss, and reasonable care should be taken to prevent them. The farmers at Sarina recognise that Red Rot, commonly a very minor factor in cane losses, can at times prove a very serious one, and considerable trouble has been caused to the farmer by Leaf Sheath Fungus and Peg Leg, or Root Rot as it is indifferently called. These are all secondary diseases by which is meant that some soil factor is the primary cause. These latter include—

Excessive drought and soil deficiency: These two act in the same way on the plant, as in both cases the necessary salts are unavailable to the plant.

Excessive moisture resulting in stagnant water, and sour soil giving insufficient aeration to the roots. It has been shown in India by Harvey in the case of fruit trees that drainage will relieve diseases due to sour soils.

Weeds also resulting in deficient aeration.

Soil acidity due to any of the above factors.

Soil acidity can be rectified by the application of lime at the rate of 1 to 2 tons per acre. The low quantity of nitrogen in the Mackay soils may also be a factor. Green crops should also be extensively grown, lime applied where necessary, and other deficiencies made up with B_3 or some other fertilizer. Sulphate of ammonia and nitrate of soda can be used with good effect, and the subsequent (not simultaneous) application of lime to correct the ensuing acidity is a necessary adjunct in these soils at any rate.

Greater tilth will also help, and in clayey basins the drainage of these will considerably ameliorate the root rot problem. Varietal resistance is also a controlling factor, but should only be a last resource, as it would be a shame to get rid of a good variety when other and easier methods are available for control. M. 1900 S. is the most highly susceptible to root troubles, and Q. 1098, M. 89, E.K. 28 are also affected.

These diseases can live over on the trash and on old stools, so fallowing and a rotation crop such as Giant Cowpea or Mauritius Bean become important in this connection, apart from their fertilising effect. Burning the trash in infected areas is recommended till the disease is under control. No plants showing the fungi should be put in.

It is intended that a lecture will be given on the subject of cane diseases at a field day on the 17th instant at the Mackay Experiment Station, and a collection of disease specimens will be exhibited so that the farmers will have an opportunity of learning the symptoms of the various diseases for themselves, and it is hoped that they will avail themselves of it.

FIELD DAY AT BUNDABERG.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, on his return from Bundaberg, informed the Press that the tenth annual field day of the Sugar Experiment Station at that place, held on Saturday, 28th May, was an unqualified success; the attendance of canegrowers was between 500 and 600.

Proceedings opened with an address by the Director welcoming the visitors, and an abstract of the experimental work carried out during the past year. This was then followed by an inspection of the fields of cane and cultivation and variety experiments. After luncheon an exceedingly interesting address was delivered by Mr. J. F. F. Reid, Editor of the "Agricultural Journal," on "Agricultural Journalism and its Assistance to the Man on the Land." This was followed by addresses on "Cane Diseases," by Mr. E. J. F. Wood, and on "Insects Affecting Sugar-cane," by Mr. R. W. Mungomery. Exhibits of cane diease and cane insects attracted considerable attention.

On the motion of Mr. T. Dexter, of the Bundaberg Cane Growers' Executive, a hearty vote of thanks was accorded to the speakers, to the Chemist in Charge of the Station (Mr. Pringle), and to Mrs. Pringle and the staff for the excellent laying out of the luncheon and the care taken of the comfort of those attending, also to the Director for the organisation of the field day.

During the afternoon a very fine demonstration of farm implements was made by the various machinery agents, which aroused the keenest interest. These included tractors, trash-burying ploughs, cane planters, rotary cultivators, disc ploughs, and fertiliser distributors.

A most interesting and instructive day was concluded about 5 o'clock, the weather being all that could be desired.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (2nd May, 1927) from the Entomologist (Mr. E. Jarvis) at Meringa, for the period March to April, 1927; dealing with various natural phases of cane-grub control affecting the early life-cycle stages of our grey-back cockchafer Lepidoderma albhohirtum *Waterh.*

Some Phases of Natural Control Affecting Cane Beetles.

At a meeting of the Australian Sugar Producers' Association, held at Mossman towards the end of July in the year 1915, one of the questions brought up for discussion had reference to the apparent scarcity of grubs in certain districts from causes unknown. The writer, who was present at the time, stated that in some instances such immunity might reasonably be attributed to unsuitability of the soil, or the absence of food-plants of the beetles in the vicinity of plantations, or to the operation of adverse climatic influences.

During the past twelve years, however, sufficient data has been obtained to throw considerable light on this interesting question which seemingly still continues to puzzle many of our intelligent cane-growers.

The chief controlling influences affecting varying degrees of grub-infestation are:—

Firstly, those brought about by prolonged spells of dry weather which happen to occur during the months of October to January;

Secondly, the disposition, with relation to infested areas, of suitable food-plants or feeding-trees of the beetle.

Thirdly, the altitude of such infested cane land; and mechanical condition of the soil.

Effect on Beetles of Drought Conditions.

Undoubtedly, the first of these controlling agents is of paramount importance, since the operation of drought conditions during the period above-mentioned is responsible at times for a mortality of 95 per cent. or more of the beetles, which, owing to the hard, dry nature of the ground are unable to reach the surface.

Such mortality is likely to prove greatest on those areas where the trees and shrubs in the immediate neighbourhood of canefields have been cleared off, thus exposing practically the whole of the surface soil to the influence of the sun.

When a check of this nature is experienced over an extent of several square miles of country, growers can hardly fail to notice the almost total absence of grubs the following season; while in the event of such a set-back having chanced to occur in a locality free from patches of timber, &c., these beneficial effects may continue for several years. We may reasonably assume, therefore, that in exceptionally favourable localities such climatic control may occasionally result in the total eradication of this pest for the time being. Reinfestation of such a district at some future date, owing to further invasion by migrating cane-beetles is, of course, possible, but very unlikely to happen.

Effect on Beetles of Position of Feeding-Trees.

With regard to the second phase of control, the action of which depends upon the disposition of the feeding-trees of this insect growing close to cane land, growers would do well to notice that instances where invasion of a district by migrating beetles has led to ultimate establishment of this pest (such as happened at Highleigh during 1897 to 1907; Bulletin No. 17, pp. 90-91) the reason for continuance of such infestation may often be due to the position of food-plants near at hand chancing to offer facilities favourable to the aerial existence and early life-cycle stages of the beetle in question. Extensive belts or clumps of timber containing feeding-trees are undesirable, especially when lying about half a mile from the south-east border of canefields; but when happening to fringe the banks of a river or creek running through the midst of cane land such trees should always be cut down and destroyed. Belts of timber lying close to north-west headlands—especially when present along the bases of mountain ranges—often form favourable breeding-ground from which the female beetles when ready to oviposit fly across into the nearest canefield to lay their eggs.

In the event of wooded mountain slopes near at hand chancing, as sometimes happens, to form a cul-de-sac on three sides of a plantation, and to be open on the other to the south-east trade wind, the cane in such situations when growing on volcanic soil is almost certain to be badly grub-infested. In cases of this sort the food-plants nearest to the plantation should be searched for and destroyed. An effort ought also to be made to capture the beetles during the first two or three weeks immediately following their emergence from the ground, by means of suitable trap-trees, like *Ficus pilosa, Ficus nesophila, Eucalyptus tessalaris,* &c., which should be planted close to headlands forming the north-west boundary of such cane land (see ''Queensland Agricultural Journal,'' Vol. xxvii., pp. 181-182; and ''Australian Sugar Journal,'' vol. xviii., pp. 673-674).

Large isolated trees which may have been allowed to grow close to roadways running through canefields, or around farm buildings, should be cut down. Big ''Tar Trees'' (*Semacarpus australiensis*), or ''Weeping Figs'' (*Ficus benjamina*) will often attract great numbers of ''grey-backs'' and serve to induce them to linger in the neighbourhood of the cane.

Effect on Beetles of Topographical and Meteorological Conditions.

Touching briefly on the third phase of natural control, which, during the flighting season, appears at times to exercise an influence on these cockchafers throughout the period occupied in egg-laying, it is generally admitted by growers that the higher portions of cane land, such as the tops or ridges of hilly country of volcanic origin are usually more often grub-infested than low-lying areas or river flats. An interesting illustration of this point occurred at Daradgee last August on volcanic country, when it transpired that the grub damage experienced on thirteen different selections was confined in every case either to hill-tops or to slopes leading up to elevated ridges. The reason for such infestation may be explained very simply if we assume that egg-laden beetles when winging their way from the feeding-trees to some suitable spot in which to deposit eggs would be likely to come to rest on the first elevated portion of cane land chancing to obstruct their line of flight.

During migration, while flying over level country, these cockchafers appear to keep at a fairly uniform distance from the ground; all travelling in the same direction at about a height of from fifteen to twenty-five feet from the surface.

Doubtless, the female beetles, when heavy with eggs fit for exclusion, would be far more likely to settle when encountering obstruction from high ground than would be the case just after emergence from the soil prior to development of the ovary.

Again, the height at which they travel (a factor of importance in this connection) is probably influenced or determined by atmospheric conditions prevailing at the time. The occurrence, for instance, of several abnormally damp or wet nights during the period of egg-laying might perhaps induce female beetles to avoid the soil of low-lying ground and river flats as being unsuitable to healthy development of their eggs or young larvæ.

This may help to explain the reason why canegrowing on well-drained soils of a friable nature is so very liable to be attacked by cane-grubs. In support of the above supposition, I may mention that during very wet weather in March and April, grubs of this beetle usually come to the surface of even well-drained soils to escape the wet, and at such times, when removing dead leaves or other débris from between cane rows, may sometimes be seen lying actually on the top of the ground.

It has been suggested that friability of the soil may attract the beetles on account of its allowing greater freedom of movement for the grubs than is possible in clay-loams or other heavy land. It seems far more likely, however, that the attraction of friable soils lies in their better aeration, a condition which appears to be very congenial to larvæ of our grey-back cockchafer.

''THE BEST EVER.''

A Chatsworth reader:—''I must congratulate you on such a fine 'Queensland Agricultural Journal' for May—the best ever.''

FIELD REPORTS.

The Northern Field Assistant, Mr. A. P. Gibson, reports (11*th June*, 1927):—

CAIRNS.

Particulars of the past season's crop and that expected for 1927.

SEASON 1926.

Mill.	Tonnage.	Area Harvested.	Tons per Acre.
Babinda	195,129	9,325	20·9
Hambledon	193,116	9,295	20·8
Mulgrave	189,349	10,005	18·9
	577,594	28,625	

SEASON 1927.

Mill.	Estimated Tonnage.
Babinda	190,000
Hambledon	160,000
Mulgrave	155,000
	505,000

It will be seen that the 1927 crop at present is considerably below that of 1926. With favourable weather much of this leeway may be made up. About 82,000 tons sugar at 94 n.t. were manufactured in 1926; this amount is valued at some £2,000,000.

The Crop.

Under the Northern sun planters live to good purpose, for the soil and climate work with them. The district crop is composed of many varieties, many of which are arrowing. Generally speaking, the cane was backward and required rain to ensure continuous growth. The scanty rainfall of the latter half of last year, and the abnormal weather of February had an ill-effect on the seasonal crop. The lowlands adjacent to the Barron and Mulgrave especially suffered by flooding, and in consequence the cane had sprouted heavily.

Varieties.

Principal varieties grown:—N.G. 15 (Badila): Where this will grow there is none just as good. The continual growing of this most popular cane without change, coupled with careless plant selection and improper cultivation is slowly bringing degeneration, consequently it is becoming more susceptible to diseases. H.Q. 426 is giving satisfaction; it is an excellent ten to twelve months cane for well-drained medium-quality soils. It is outstanding in quality, but, unfortunately, is one rather subject to most diseases. H.Q. 485 is not a popular cane, as it is a shy stooler, therefore permitting continuous sunlight and heavy weed growth. B. 147, D. 1135, and 7 R. 428 really cannot be classified as good all-round canes in this district, yet are suitable for some of our drier and less fertile soils. The growing of Q. 813, Korpi, and E.K. 28 might be extended with profit to growers and manufacturers alike on selected soils.

Cultivation.

The planter's object at all times should be to win greater and superior crops from his land, with a minimum of costs, which will enable him to meet the ever-rising tide of competition; the prospects, of course, favour the man with the better land. We must get to know our soils and study more closely disease-free varieties of quality most suitable for them. Tractors are numerous and necessary to speed up our most important field work. Many fields, however, are badly designed for their economic use; the pulls are too short, much time and extra wear and tear are occasioned when turning.

Planting.

It should be understood that if diseased plants are used they will produce diseased canes; this operation should be surrounded with all necessary precautions. The planting period is fast approaching; in fact, some have planted, others are planting, and many are busy preparing for this important work. In view of this a few notes may prove helpful.

(1) Avoid hurry-up or improper cultivation. Better cultivation returns butter crops.

(2) **Important.**—Select suitable disease free, vigorously-growing cane of quality for seed, use a sharp knife for cutting, eliminate anything faulty; rooty end plants or immature or cabbage-tops should be discarded.

(3) The fertility of the soil, variety intending to plant and subsequent interspace cultivation generally determine the space between cane drills in Queensland; this varies from 4 to 5 feet. Heavy foliage and good stooling varieties require a greater interspace than do erect sparse-leaved ones. In ploughable land, seed may be placed almost continuously in drills some 2 to 3 inches of soil covering should be ample. This, however, is subject to seasonal conditions, and time of planting. Throwing whole canes in the drill, cutting up and covering them as they lie, is not plant selection.

(4) Endeavour to control weed growth in fields and headlands right from the start by timely cultivation.

Pests and Diseases.

Grubs have been responsible for a considerable amount of damage in isolated fields. Top Rot, Leaf Stripe, and Leaf Scald were present in the area. Top Rot was occasioning severe crop destruction in parts of Freshwater; this complaint appeared to be waning. This has occurred in our canefields more or less for many years past. In the year 1893 at Macknade, it is reported the entire crop of available cane then in view in the limited area of its occurrence was destroyed and thrown into the river. Year 1903, Henry Tryon made an inquiry into the nature and origin of this malady, and he considered it to be primarily and essentially a disease of the roots, and that the abnormal conditions under which the disease occurs are principally climate. Leaf Stripe had spread to other varieties and fields at Sawmill Pocket. Leaf Scald was found to be more prevalent in the Gap and Freshwater area. Gumming disease was not found at Aloomba this inspection.

MOSSMAN.

This most northerly sugar factory for years past has been in want of more cane; because of this and the district's isolation it has not progressed as others have done. Its cane area contains some inferior land which cannot be substituted for better, therefore its available ground is inadequate under most favourable conditions to provide cane enough to supply profitably the mill's seasonal requirements.

In Retrospect.

The following figures are interesting and show the upward progress of the mill since 1923:—

Particulars.	1923.	1924.	1925.	1926.
Number of Suppliers	120	125	146	153
Tons of Cane Crushed	75,544	83,460	80,276	84,579
Tons Sugar at 94 n.t.	10,320	9,495	10,503	11,130
Average c.c.s.	15·07	12·64	14·2	13·72
Co-efficient of work	90·65	90·0	92·14	95·91

The average cane tonnage per acre for the district was 14.1 compared with 14.6 of last year. The cane reached its peak of quality between the middle of September and the middle of October. Some 4,000 samples were tested. Appended is the average c.c.s. of the main varieties milled, together with the area under crop of each:—

Variety.	Area under Crop.	Percentage Area.	Percentage c.c.s.
H.Q. 426	1,579	26·4	14·65
N.G. 15 (Badila)	1,321	22·1	14·21
Q. 813	131	2·2	14·17
M.Q. 1	45	·7	13·89
D. 1135	1,635	27·5	12·95
M. 189 (Black Innis)	120	2·0	12·85
Green Goru N.G. 24 B	234	4·0	12·49
B. 147	557	9·3	12·37
Mixed Canes	348	5·8	..

It will be seen that H.Q. 426 is again leader in the field as far as quality is concerned.

Soils.

Generally shallow and cohesive; lime, more draining, better tilling, and the growing of leguminous crops is necessary to improve its physical texture.

Cultivation.

Cultivation had obviously improved; some plants yet appear fogged by old style methods. The better cane price of last year had given the farmer heart to do things and enabled some to purchase tractors. It is gratifying to note the farmers are grasping the immense importance of improved cultivation before and after planting, also better plant selection. The management is alive to this part of the business and is endeavouring to help raise the district's yield of cane and sugar. Improved returns can be achieved by reducing the area planted to D. 1135—a medium quality and hard-cutting cane—and in its place plant the following better varieties:—Q. 813, Korpi, Oramboo, J.E.K. 28, and Badila (where it will grow); H.Q. 285 also should do well in this area. For years past two H.Q. 426 sports have been noted on Bonnie Doon. So far as is known, such sports are rarely better than the parent cane. Excellent crops of Q. 813 and E.K. 28 were noted in poor to medium-quality land.

Planting.

A larger area than usual has been planted, which if given timely cultivation and a favourable season, should yield a greater crop for 1928. It is beneficial to plant immediately after the final ploughing where the soil is cohesive. Lining out with sticks and drilling with the swing type of plough wastes time and is ancient. More economic and superior work is performed by the drill plough with marker attached. Do not drill too far in advance of planting, as soil moisture is unnecessarily lost thereby.

The Crop.

Since the blow, the crop has taken advantage of the favourable weather, and in consequence appeared half a ton better per acre this year. It is forecasted that some 82,000 tons will be harvested (providing the weather holds good) from nearly 300 acres less to cut than in the year 1926.

Pests and Diseases.

Grubs were responsible for greater damage than usual. Wire worms had destroyed many primary shoots. So far, rats have caused little injury; as the season becomes drier the destruction is likely to increase. Leaf Stripe, Leaf Scald, and a little Mosaic was noted in H.Q. 426. The outstanding disease is, of course, Leaf Stripe; this has been in the area for many years past, and is very prevalent in B. 147, D. 1135, M.Q. 1, N.G. 24 B., Q. 855, and, to a lesser degree in N.G. 15

and H.Q. 426. In a small area of B. 147 it was difficult to find a disease-free stool. We can only recommend the following:—

(1) Better plant selection;
(2) Removing affected stools in less-infected areas;
(3) Plough out severely diseased fields;
(4) Use leguminous crops;
(5) Important.—See that none of the old stubble remains prior to planting;
(6) Plant up with a variety change.

Noxious Weed.

Guinea Grass, a pest known as Star of Bethlehem, is spreading too rapidly; this should be kept under control.

Railroad Extension.

The tramway to the Whyanbul Creek section is being extended nearly half a mile.

MAIZE STORAGE AND WEEVILS.

The question as to whether husked maize keeps free from weevils longer than unhusked grain has been raised again by some Southern farmers. This is what the New South Wales Department has to say about it:—

The early maize crop develops weevils so badly that every means of minimising the damage should be taken advantage of. Such maize is generally brought into the barn or shed and stored for a time until it is fit to shell. The question, however, arises as to whether it is best to harvest maize—early or late maize—in the husk or husk it from the standing stalks. The usual method on the North Coast (N.S.W.) is to pull the ears in the husk and store in the sheds until fit to shell or until required. On the larger farms contract or private husker-shellers are used, but on the smaller farms hand-husking is resorted to, followed by shelling with a small machine by the farmer himself.

On the South Coast (N.S.W.) and in the cooler tableland districts, where weevils are not very injurious or are altogether absent, and where the winters are colder and the maize takes longer to dry out, it is advisable or necessary that the ears should be husked before storing. On the average North Coast (N.S.W.) farm, maize in the ear, either husked or unhusked, cannot be successfully fumigated in the usual type of shed, and the question is: How does maize keep best—husked or unhusked? In the case of early maize, it is better on reasonably small areas to husk from the standing stalks, thus ridding the ears of a large number of weevils, and reducing the number carried into the storage sheds. It is best that this early maize should not be kept long.

Storing Late Maize.

Even late maize should not be kept too long in the cob; it is better shelled and stored as shelled grain. But where there are no facilities on the farm for storing as shelled grain, and where late maize has perforce to be kept on the cob, it will be found best on the North Coast (N.S.W.) to keep it in the husk. Such late maize is not greatly infested at harvest (in the winter), and if it were husked it would be at once exposed to weevil which had been breeding in the shed from the early crops. Unhusked, only those ears which are not well covered with husk are infested for the most part, and with a variety which has been well improved in respect to its husk covering, late maize stored in the husk will keep very well for some time.

It has been suggested that, in average varieties, it would be a good plan to separate at harvest the well-covered ears from those poorly covered with husk, and that the former could then be kept for a very long time, but this is not quite a practical suggestion. Moreover, detection of infested ears from the appearance of the husk in every case is scarcely possible, while earworms and rodents lessen the protective value of the husk covering in storage, so that apparently resistant ears may become infested.

Summing up, it appears that the North Coast (N.S.W.) farmer would be best advised to husk the early maize at harvesting if the area is not too large and if hand-husking is the usual practice on the farm, and to harvest and store the late crop in the husk. At present, for the most part, the whole of the maize crop is harvested and stored in the husk.

CANE-GROWING AND ITS PROBLEMS.

FIELD DAY AT BUNDABERG.

FARMERS GATHERING AT THE MARGAM EXPERIMENT STATION.

Between 500 and 600 farmers from all districts included in the Southern Sugar Belt assembled on Saturday, 28th May, at the Sugar Experiment Station at Margam, near Bundaberg, for the Annual Field Day. That the interest of all sections of the industry is being maintained in scientific agriculture was plainly evident by the enthusiasm and keen appetite for information displayed by the large gathering.

The beneficial effect of the bountiful rains of last summer was seen over a country-side of wonderful beauty. The arrangements at the Station for the entertainment of the visitors and their tour of inspection through the experimental plots were complete in every detail. Under the guidance of the Director of Sugar Experiment Stations, Mr. H. T. Easterby, assisted by the Station staff, they were piloted through the fields.

Much interest was manifested in the new canes undergoing furrow tests.

Power cultivation outfits were also seen in action, and their fine field performances followed with close attention.

At the luncheon interval several interesting addresses were delivered to a large and appreciative audience. Subjoined is an abridged report of the proceedings.

THE Annual Field Day at Bundaberg on 28th May was an unqualified success from every standpoint. Apart from their educational value, such gatherings have also a high social value, for they are really annual reunions at which farmers from different districts meet one another and discuss matters of mutual concern.

Included among the visitors were Messrs. H. T. Easterby (Director, Bureau of Sugar Experiment Stations), J. F. F. Reid ("Queensland Agricultural Journal"), E. J. Fergusson Wood and R. W. Mungomery (officers of the Bureau), F. M. Forde, M.P., W. A. Brand, M.L.A., W. G. Gibson, as well as farmers from Maryborough, North Coast, Mount Bauple, Goodwood, the Isis, Pialba, Gin Gin, Wallaville, Bucca, Avondale, and other centres.

At 11.30, the Director called the gathering together in front of the office at the Station, and in the course of a short address reviewed the work of the Station for the past twelve months.

Before proceeding with the main topic of his address, Mr. Easterby, who was given a rousing reception, said he desired to apologise for the unavoidable absence of the Acting Premier (Hon. W. Forgan Smith). The programme for the day was the same as in former years, a walk through the fields, followed by a light luncheon, several short addresses, and then a display with various implements.

He thought they would agree with him that the display of farm implements was the best ever presented at the Station. He desired specially to mention Messrs. Wypers Bros., as that firm had always provided an interesting display. On this occasion the firm had exceeded previous efforts. Messrs. Wyper Bros. were taking on the manufacture of farm implements on an extensive scale, and the service they were rendering to the industry could not be over-estimated. They had shown commendable enterprise, and it was certainly a great advantage to the industry to have such a firm taking an active interest on the mechanical side.

Fertilising Experiment.

The experiment with mixed manures containing a heavy dressing of potash was concluded last season, and the results were most interesting and conclusive, as they further confirm the necessity for potash on these soils. The yield of all these plots

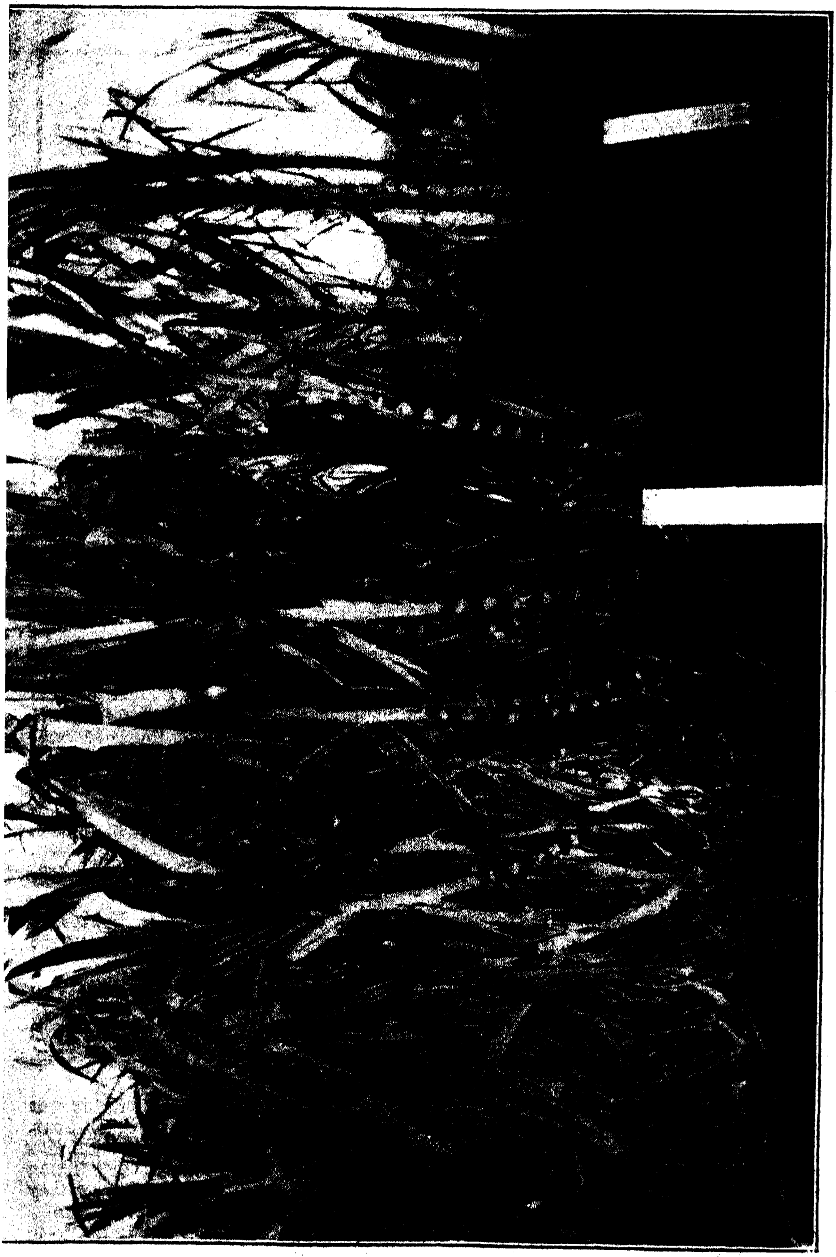


PLATE 1.—A STAND OF CANE AT THE SUGAR EXPERIMENT STATION AT MARGAM, NEAR BUNDABERG.

Fine Stools of Q.1098.

Which Economy do you Study—
Initial or Ultimate?

Too much emphasis cannot be laid on the word "ULTIMATE."

If ultimate economy interests you, the

RONISCH
PLAYER
PIANO

will interest you.

Initial cost should not be the sole influencing factor in the purchase of a Player Piano. Cost over many years and the satisfaction and pleasure derived should be the main considerations.

If you buy wisely, after carefully weighing the essentially important points, your choice will inevitably favour the best—the Ronisch.

Even if you decide to buy cheaper in the first instance, you will eventually purchase a Ronisch—so why not now? We arrange Deposits and Terms to suit all purses.

Call and inspect or write for free catalogue and full particulars.

SOLE AGENTS:

Palings

BRISBANE
TOOWOOMBA
ROCKHAMPTON
TOWNSVILLE

BRUNNING

BEST FOR BEARING

FRUIT TREES

(True to Name and Healthy)

are planted throughout Australasia. Apples, Pears, Plums, Peaches, Nectarines, Quinces, Mulberries, Oranges, Lemons, etc.

Shipments made to all Parts of the World.

JOHN BRUNNING & SONS

Established 60 Years

SOMERVILLE NURSERIES
SOMERVILLE, VICTORIA, AUSTRALIA

Chicks-Chicks-Chicks

Day-old Utility

Black Orpington and White Leghorns

From World's record laying strain. We are now booking orders for delivery from June to October. £5 per hundred, £2 10s. for fifty, 15s. per dozen; special quote for larger quantities. 10s. per 100 secures booking, freight paid. Instructions for feeding, etc., supplied with every order. Also settings 7s. 6d. Stock for sale. *Square deal guaranteed. Correspondence invited.*

Woodlands Poultry Farm
Beerwah, Queensland

A Complete Service in Fertilisers and Sprays

We can supply all your requirements in fertilisers, sprays, spraying and dusting machines, pest destroyers, etc. We carry the largest stocks in the State at competitive quotations. Prompt efficient service to all orders, large or small. Full information on the fertilisation and spraying of crops gladly given on request.

A.C.F.
REGISTERED TRADE MARK.

FERTILISERS

THERE'S A DIFFERENT
A.C.F.
COMPLETE MIXTURE
FOR EACH CLASS OF CROP,
also—

BONE DUST,
LIME,
SUPERPHOSPHATE,
POTASH,
SULPHATE OF AMMONIA,
NITRATE OF SODA,
NAURU PHOSPHATES,
SULPHUR AND SPRAYS
OF EVERY DESCRIPTION.

Write Now for Prompt Quote.

AUSTRALIAN CO-OP. FERTILISERS LTD.,
LITTLE ROMA STREET, BRISBANE.

of second ratoons last year was poor, due to the severe drought, but the plot to which no manure had been applied only gave a yield of 1.34 tons of cane, having practically died out. The average results for these crops, plant, first, and second ratoons, were—

Plots 1 and 3 to which a mixture of 100 lb. of sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks had been applied, gave an average yield of 17 tons of cane per acre, while the plot to which no manure had been applied yielded 10.41 tons of cane per acre—the difference being 6½ tons of cane per acre in favour of the manure. Analyses of our red volcanic soils in Bundaberg and Childers show them to be very low in available potash, and many of them are low in total potash also. The application of potash in larger quantities in our mixed fertilisers could, therefore, be recommended on this type of soil.

Other Experiments.

Other experiments were laid down in connection with the use of potash, as under:—

Plot 1.—700 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure.

Plot 2.—500 lb. sulphate of potash per acre.

Plot 3.—No manure.

Plot 4.—No manure.

Plot 5.—500 lb. sulphate of potash per acre.

Plot 6.—700 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure.

The yields in the plant crop last year, due to the dry weather, were low, but this year, as they would see, the manures were going to give results. The results last year were slightly in favour of potash used alone.

Further trials with potash manures would be made commencing this year as follows:—

Division E3, Plot No. 1; variety, D. 1135; ordinary ploughing; cowpea planted; average weight of cane per acre, 14.90 tons; yield of c.c.s. per acre, 2.11.

E3, Plot 2, D. 1135; ploughed and subsoiled; cowpea planted; average, 17.97 tons; c.c.s., 2.59.

E3, Plot 3, D. 1135; ordinary ploughing, but fertilised with 100 lb. sulphate of potash, and 200 lb. meatworks manure applied broadcast previous to planting cowpea; average, 18.46 tons; c.c.s., 2.23.

E3, Plot 4, D. 1135; ordinary ploughing; cowpea planted; average, 15.64 tons; c.c.s., 2.21.

First Series.

Plot 1.—300 lb. sulphate of potash per acre.

Plot 2.—300 lb. muriate of potash per acre.

Plot 3.—500 lb. sulphate of potash per acre.

Plot 4.—500 lb. muriate of potash per acre.

Plot 5.—No manure.

Second Series.

Plot 1.—300 lb. sulphate of potash per acre.

Plot 2.—300 lb. muriate of potash per acre.

Plot 3.—500 lb. sulphate of potash per acre.

Plot 4.—500 lb. muriate of potash per acre.

Plot 5.—No manure.

It was desired to make further comparisons with sulphate and muriate of potash.

Further manurial experiments with first ratoons gave the following figures:—

Four plots to which a mixture containing 100 lb. of sulphate of ammonia, 150 lb. nitrate of soda, 150 lb. sulphate of potash, and 200 lb. meatworks per acre yielded 28.74 tons of cane per acre, and 4.16 tons of sugar per acre, while four plots without manure gave a yield of 12.41 tons of cane per acre, and 1.56 tons of sugar per acre. This gave an increase for the use of 600 lb. of mixed fertiliser of 16.33 tons of cane per acre and 2.60 tons of sugar per acre, a particularly fine result and a most payable one, the cost of the manure and its application being about £4 5s. per acre.

Photo.: W. J. Cunningham, Bundaberg.]

PLATE 2.—UNDER THE PINES. FIELD DAY AT BUNDABERG.

An inspection of Experimental Sugar-Cane Plots, followed by welcome refreshments. The enterprising lad in the left foreground is still "on the bottle"—lemonade in this case.

Experiment with Sulphate of Lime or Gypsum.

Previous reports had shown that no results had ever been achieved at the Bundaberg Sugar Experiment Station for the use of lime oxide or lime carbonate. A trial was now being given to lime sulphate. In the plant crop the results were negative, and this was repeated last season in the first ratoon crop, the plot with no sulphate of lime giving a slightly higher yield than the plots to which sulphate of lime was applied.

Experiments with Green Manure.

In the preparation of this land before planting cowpea, Plots 1 and 4 received ordinary ploughings only; Plot 2 was subsoiled in addition, and to Plot 3 100 lb. sulphate of potash and 200 lb. of meatworks manure were applied.

THROUGH THE FIELDS.

At the gates before entering the field a copy of the programme was handed to each farmer, thus enabling him to follow the various experiments as they were detailed by Mr. Easterby. The programme was as follows:—

Sugar Experiment Stations were established for the purpose of conducting experiments with sugar-cane, such experiments comprising cultivation, planting, manurial, and other investigations.

The experiments with canes, cultivation methods, and growth of varieties will form part of to-day's demonstration, and a list now follows for the general information of visitors.

The figures in brackets denote the commercial cane sugar or c.c.s. of the different canes; when c.c.s. figures are not given, no analysis has yet been made:—

Division C1.—Badila, second ratoons, nineteen months old—

Plot 1.—Mixed manure (17).

Plot 2.—No manure (17.0).

Manures applied in November, 1925, consisted of 150 lb. sulphate of ammonia, 100 lb. nitrate of soda, 150 lb. sulphate of potash, and 200 lb. meatworks fertiliser per acre.

Early in 1927, 100 lb. of sulphate of ammonia and 50 lb. nitrate of soda per acre were applied as a top dressing.

The yield of the first ratoon crop in 1925 was 30.11 tons from the manured plot and 15.54 tons from the unmanured crop, showing an increase of 14.57 tons per acre for the use of the mixed manure.

The difference in the growth of the experiments was most clearly marked, and Mr. Easterby remarked on the advantages resulting from scientific manuring.

Division C2.—Mauritius 1900 Seedling, first ratoon, eight months old. Revenue.

Division D.—Indian canes: Varieties, plant canes, twenty months old. Revenue—

D. 1135 (14.5), Q. 813 (16.0), Co. 227 (15.0), Co. 213 (14.0), Co. 210 (15.0), Yellow Caledonia (14.22), Assam Red (15.0).

Mr. Easterby said that a number of the canes included in the division had been introduced from India. The three Co. were rather thin, but they were being tested. Assam Red had proved a very good cropper in India, and was doing well here. Yellow Caledonia was very popular in Hawaii, and it also gave excellent promise in Queensland.

Divisions E1 and E2.—Q. 813, first ratoons, eight months old (16). Experiments with manures—

Plot 1.—Mixed manure, consisting of sulphate of ammonia 100 lb., sulphate of potash 500 lb., and meatworks 100 lb. per acre.

Plot 2.—Sulphate of potash only—500 lb. per acre.

Plot 3.—No manure.

Plot 4.—No manure.

Plot 5.—500 lb. sulphate of potash per acre only.

Plot 6.—Mixed manure, consisting of 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks fertiliser per acre.

Division E3.—D. 1135, second ratoons, nine months old (14.5), green manure experiments.

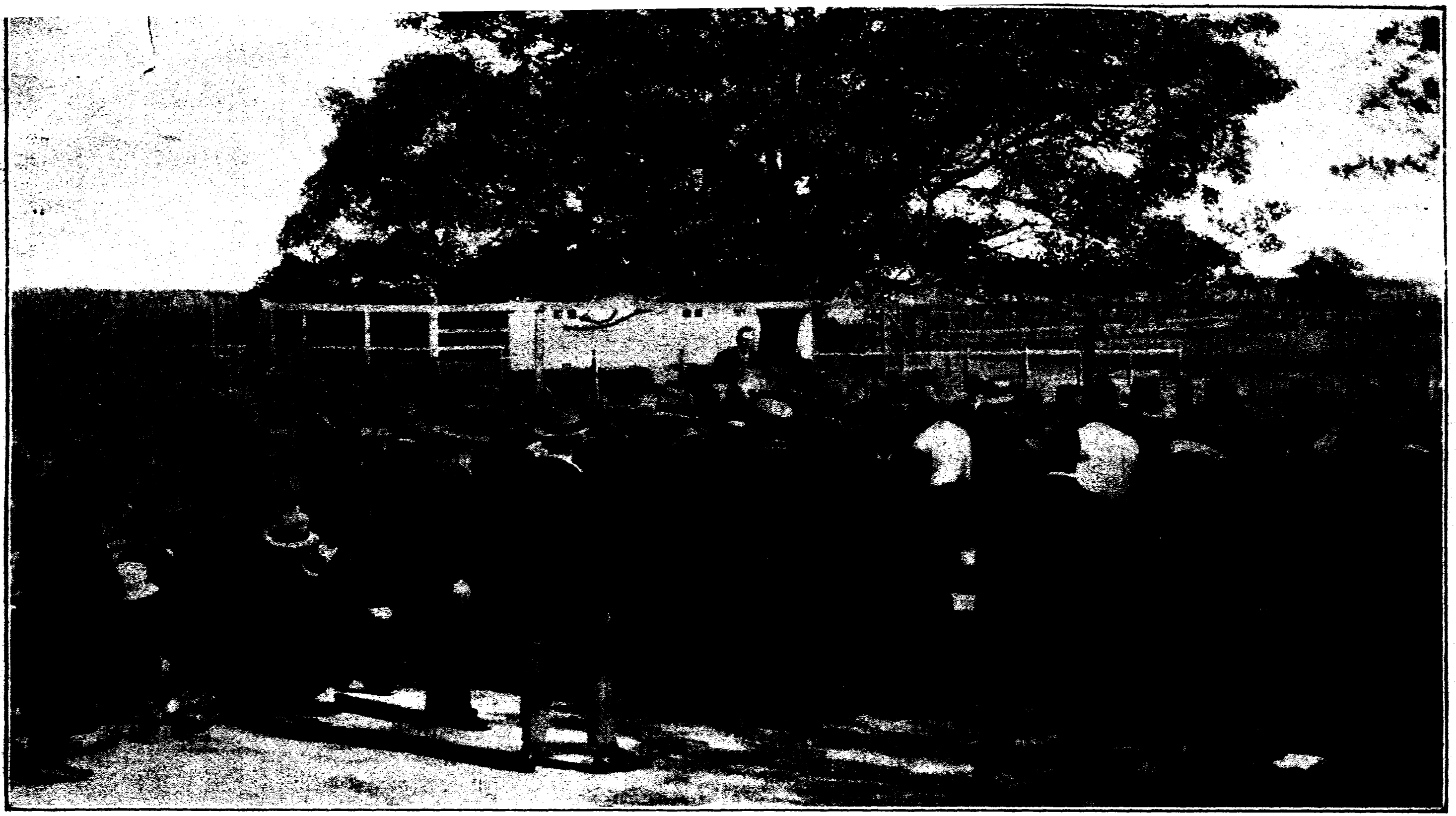


Photo.: W. J. Cunningham, Bundaberg.]

PLATE 3.—AFTER LUNCH ADDRESSES UNDER THE CHAIRMANSHIP OF MR. EASTERBY.

The Editor of the "Queensland Agricultural Journal" (Mr. Reid) on the rostrum. A section of the crowd numbering between 500 and 600 cane farmers. Many others are seated in the ring and at the rear.

The treatment of the plots before the growth of green manures was as follows:—

Plot 4.—Ordinary ploughing.

Plot 3.—Ploughed and subsoiled.

Plot 2.—Ordinary ploughing, and 100 lb. sulphate of potash and 200 lb. of meatworks fertiliser applied per acre.

Plot 1.—Ordinary ploughing.

Division B6.—Badila standover, first ratoons, twenty-two months old.

In 1925 these plots gave the following results as a two-year-old crop—namely, 41.66 tons of cane and 6.44 tons of commercial cane sugar per acre.

The manure applied was a mixed fertiliser at the rate of 150 lb. of sulphate of ammonia, 150 lb. sulphate of potash, 150 lb. meatworks fertiliser per acre, with a top dressing of 200 lb. nitrate of soda per acre the second year.

This shows what could be done by growing Badila as a two-year crop, seeing that the costs of cutting and cultivation of one crop are saved. The use of fertiliser, however, is unnecessary.

Division B5.—New cultivation experiment.

Division B4.—Competition trials with sulphate and muriate of potash.

Division B3.—Q. 813, first ratoons, eight months old (16), manurial experiments.

Plot 1.—No manure.

Plot 2.—Mixed manures, as follows:—Sulphate of ammonia, 150 lb. per acre; sulphate of potash, 200 lb. per acre; meatworks fertiliser, 250 lb. per acre.

Plot 3.—Same as plot 2.

Plot 4.—No manure.

Plot 5.—Same as plot 2.

Plot 6—Same as plot 2.

Division B2.—D. 1135, second ratoons, nine months old (14.5), experiments with calcium sulphate or gypsum.

Plot 3.—No sulphate or lime per acre.

Plot 2.—Two tons of sulphate of lime per acre.

Plot 1.—One ton of sulphate of lime per acre.

The average yield of these plots for the plant and first ratoon crops was as follows:—

Plot 3 (no lime), 20.28 tons per acre.

Plot 2 (2 tons sulphate of lime), 19.33 tons per acre.

Plot 1 (1 ton of sulphate of lime), 18.52 tons per acre.

These experiments tend to show that even where the form of lime is changed from carbonate to sulphate, lime still refuses to give any benefit on the Woongarra red soils.

Garden.

E.K. 28 plant cane, twenty months old (15.0).

E.K. Madoe plant cane, twenty months old.

D.I. 52 plant cane, twenty months old (14.27).

Q. 1098 plant cane, seventeen months old (15.0).

H. 227 plant cane, seventeen months old (14.7).

E.K. 28 plant cane, seventeen months old (15.0).

M. 28/10 plant cane, seventeen months old.

M. 35.11 plant cane, seventeen months old.

The Sugar Experiment Station will be pleased to welcome visits from canegrowers at all times, and to give them full information and advice as to varieties of cane and cultivation. Farmers are requested to make the utmost use of the station, in submitting problems as to soils, cultivation, fertilisers, &c.

On their return from their walk through the fields all present were entertained at a delightful al fresco luncheon arranged by the officer in charge of the Station (Mr. J. Pringle) and Mrs. Pringle, who were assisted by a number of ladies. Tables were set out on the lawns and refreshments were served.

THE ADDRESSES.

AGRICULTURAL JOURNALISM.

With the luncheon over, the farmers were called together by Mr. Easterby, and from a seat on the lawn several interesting and instructive addresses were delivered.

Mr. Easterby briefly outlined the course these would take, and then called on Mr. Reid, the Editor of the "Queensland Agricultural Journal," for a speech.

Mr. Reid, who was very cordially received, said he was indeed pleased to have the opportunity of addressing such a large gathering of farmers. He desired to congratulate the sugar industry on its remarkably efficient organisation, of which they had that day abundant proof. In preceding years he had attended field days at South Johnstone and Mackay, at which were large gatherings of farmers, but this year's gathering at Bundaberg eclipsed the others in point of attendance. He congratulated the Queensland sugar-growers on being the first section of the agricultural industries to endow a scholarship at the University. It showed that the farmers were anxious to further the scientific side of their calling.

Journalism and the Farmer.

It was with real pleasure that he had accepted Mr. Easterby's invitation to say something to farmers in a general sort of way about journalism, particularly agricultural journalism.

Journalism was the most truly democratic of all callings, yet in the history of mankind newspapers had been stronger and more powerful than armies. Napoleon, they were told, feared four hostile newspapers more than an enemy battalion, and immediately placed them under an extremely rigid censorship.

Mussolini, his modern imitator, had evidently the same healthy fear of a hostile Press, so they found him suppressing the newspapers within his realm that had the temerity to detract from the virtues of the Italian dictatorship.

If anyone felt inclined to question the influence of the Press, they had only to remember the newspaper censorship during the war. If they had never before realised the subtle power of journalism, they realised it then. Living under rigorous censorship of the only news that mattered to them then, the absence of complete news of the plain facts caused grave anxiety morning after morning, and they soon learned how very easy it was to give credence to every rumour of bad news, or worse news of national disaster.

"The truth is," to use the words of Arthur Mee, the well known English writer, "that without the journalist, life as we know it would be impossible. He stands between light and darkness, between social peace and civil war, between democracy and despotism, between the freedom of the twentieth century and the thraldom of the less enlightened ages. He is the guardian of the liberties of the human race."

The Reflector of Human Life.

Since journalism then was the reflector of human life, nothing in human life could happen that was outside its range. As memory, whether they liked it or not, engraved upon itself the everlasting remembrance of everything they saw, or heard, or did, or knew, so journalism brought, as Mee further remarked, all life, all activities, all thought, all labour, into its boundless field. Nothing was too trifling for its interest; nothing could be too important for its debate.

To go further, and become exact: As the mind edited the memory, calling up at will those things which interested it, whether facts, or scenes, or men, or things, whether they had treasured them for a day or half a lifetime, so the mind of the journalist edited the happenings of every day and every hour, appreciated this, questioned that, threw the other into the basket, and presented his story to the waiting world with a judgment born of an intimate relation with men and matters and a sound knowledge of the relative value of things.

The whole world was alive to the journalist who knew his work and was in earnest, and to whom the first of all considerations, to himself, was his own sincerity.

Whatever one might think of the Press, however—and to many of them its reputed power might, mistakenly he thought, seem largely an illusion—it could not be denied that the newspaper or journal contained much in the way of romantic interest to most of them.

Like the farmer, the editor was never stuck for advice or advisers. Just as every second train traveller—if he had never swung more than ten yards off a blotting pad, or had never by any chance swung between a pair of plough handles, he is all the more emphatic—just as every second traveller was ready and willing to advise the farmer how to farm, so almost any man felt that he could give points to any editor in running what was sometimes called euphoniously a "rag."

The history of the Press was a record of initiative and perseverance, and the triumph of pluck in face of tremendous difficulties—and it disposed effectually with the popular belief that any fool could run a newspaper. That was, however, by the way, and their main purpose was to take a rapid survey of what journalism meant to the farmer, and to what extent it was an aid in solving the rural problems of to-day, which, as they all knew, were problems of straightout construction or reconstruction.

The First Agricultural Journal.

The needs and advantages and virtues of country life were themes that had run through literature for over 2,000 years, and, possibly, even further back than that. In the first century before Christ they found a cheerful Roman, Terentius Varro, issuing what was probably the first agricultural journal—"De Re Rustica," or "Rural Life," wherein, contributing to the age-old argument as to which was better, town or country life, he said, "Divine nature gave us the country, man's art built the city." In these days, however, they recognised the value of each of these factors in the general scheme of things, and in Queensland particularly they were realising the inter-dependence of primary and what was called secondary industry.

Each depended upon the other, and it was upon the balanced development of both that real national greatness was achieved.

Most people, however little they knew of journalism, knew the difference between a bright and dull publication. In the dull journal there was no change. It remained to-day what it was yesterday; it would be to-morrow what it was to-day. The next issue would look exactly like the last. It never disappointed, because it gave them nothing new to expect. It never surprised them, because they knew exactly what it was going to tell them.

The bright journal, on the other hand, looked as though it were alive—a throbbing, pulsating thing. As they opened it, they felt that they lived in a world very much awake, a world that was athrob with vital human interests, a world full of realities, with room, too, for the dreamer, who so often was the father of those realities.

Knowledge Versus Ignorance.

Agricultural journalism, continued Mr. Reid, was mainly educational. Education was the one thing for which no nation ever paid too much. Knowledge might cost a lot, but ignorance cost more. Ignorance was the greatest cause of waste. Ideas governed the world. In scriptural phase, "Where there is no vision the people perished."

The highest aim of education was to create new and strengthen old and tested ideals, blaze new trails of thought, and open new channels of effort and new furrows of industry. In furthering that aim, agricultural journalism was a sound and extending influence.

Production with Skill and Distribution with Wisdom.

In Australia to-day they, as an intelligent people, had accepted the fact that to build bigger and better a nation must produce with skill and distribute with wisdom. That fact, he thought, they all regarded as a leading factor in agricultural economy—a fact that was being hammered home by their agricultural Press.

Tribute to the Queensland Press.

Mr. Reid paid a high tribute to the Press of the State. Queensland, he said, was very fortunate in having a country Press of a very high standard. In the northern, central, and southern divisions of the State, journals devoted almost entirely to the interests of country people gave good service to the agricultural industry. In no capital in Australia was so much space allotted to rural affairs by metropolitan dailies as in Brisbane, while, from a farmer's point of view, the service given to his industry by his own local district papers could not be estimated too easily.

Results of experiments and notes on current agricultural topics and problems found with them ready acceptance and publication in full with wise and understanding comment.

Then there were the sectional periodicals, published monthly, as a rule, that keep the farmer well informed of matters within the range of his more immediate industrial interests.

This active and valuable form of agricultural extension work, ably supplied and willingly given, merited all their appreciation.

Then there were the official publications of the Department of Agriculture and Stock, the chief of which was "The Queensland Agricultural Journal."

That journal could scarcely be described as one of light agricultural literature, but as a journal of record, research, and general information it performed some really useful public service.

The Job of the Agricultural Journalist.

Concluding, Mr. Reid said that while their scientists and field officers were able to get at the facts of any particular problem, whether of the laboratory or the field, the journalist had to get the ear of the farmer and impress him, if he could, with the economical importance of the scientists' and fieldmen's discoveries and investigations.

In healthy and progressive agricultural development, experimental work, they all knew, was essential, but if its results were not conveyed to the farmer, who, himself was often an original investigator, in a readable, digestible, and readily accessible form it was of little real service to the community. That was the job of the agricultural journalist. The value and importance of that work was quite obvious to every thinking farmer, and the farmer in alliance with the scientist, the engineer, the trained organiser of modern marketing, and the journalist might be depended upon, he thought, to see that their great rural advantages and opportunities in Queensland would not be neglected nor denied.

And the farmers of Queensland, no doubt, already appreciated fully the part of journalism, serving agriculture as comprehensively and efficiently as it served every other industry, was performing, and would continue to play in placing and sustaining agriculture in Queensland on a solid and lasting foundation, on which the prosperity of the State, ever extending, was based. (Applause.)

CANE DISEASES AND PESTS.

Mr. Easterby, in introducing Mr. E. J. Ferguson Wood, of the scientific staff of the Bureau, said that Mosaic had caused considerable damage in America. The two young men who were in America had been making investiagtions, and had sent out two cures which were at present being tried out. They were claimed to be disease resisters, and if they proved satisfactory they would be made available to farmers.

At the present time it was considered not advisable to distribute plants from the Bundaberg station. However, it was not the intention of the Bureau that any hardship should be levelled on the farmers as a result, so that if plants were needed these would be made available from the Mackay station.

Mr. Wood, in the course of an informative address, said that he intended to discuss briefly the cane diseases which were of greatest importance to them in the Bundaberg and Isis districts, and he had provided samples of the various diseases for them to examine carefully so that they would be able to recognise them in the field. He proposed to just give an outline of the symptoms, method of spreading, and control. For the sake of convenience they would divide the diseases into major and minor diseases. Major diseases included for their purpose Mosaic, gum, leaf stripe, and Fiji disease. Minor comprise iliau, root rot, and other root troubles, and "X" disease in Childers.

Mosaic could be detected by the irregularly striped leaves, with which most of them were familiar. The patches of light and dark green appeared even in the youngest leaves, which fact served to distinguish Mosaic from the leaf-insect bites which farmers so often mistake for the disease. Often, especially in D. 1135 and M. 1900 S., less in Q. 813 and Black Innes, the stem is also striped, and may be shrunken and ribbed and even cankered.

Two Types of Infection.

There were two types of infection—primary and secondary. Primary was by infected cuttings; secondary by insect transmission. For this latter they blamed the corn aphis and the cane leaf-hopper which they might see on almost any cane stalk. Often they would see one infected stick in a stool of cane. This was an undoubted case of secondary infection, but the whole stool should be regarded as infected for planting purposes. Their control was based on those facts and on the fact that resistant varieties occur such as Q. 813.

The measures, recommended were, firstly, never to plant a diseased set, or even a stick from an infected stool, though that stick might not be showing the disease.

Photo.: W. J Cunningham, Bundaberg.]

PLATE 4.—POWER FARMING—A DEMONSTRATION AT THE BUNDABERG FIELD DAY.

Always choose the least infected field for plants, or if necessary get them from another farm. In the badly-infected areas near the river let them get rid of the wild sorghum and other grasses growing in the fields and on the headlands, for these were a source of infection, and to get plants from other clean areas. If they had gullies full of wild sorghum it might pay to plant Uba cane to get rid of the grass and use it for cow feed. Uba was immune to Mosaic and would grow rank in the gullies.

Corn and Cane.

In all cases corn should not be grown near cane, as Mosaic was undoubtedly spread in that way. It was not done up North, and the areas were almost free of Mosaic. Controlling bad cases of Mosaic is a slow process and they must expect the improvement to be gradual. Continued and strict seed selection is the only method, and it would pay. Remember they could easily lose 10 tons per acre on a 30-ton crop through Mosaic, and not notice the loss if they did not realise what a healthy crop would look like. Mosaic was one of their worst troubles. When the disease was less than 5 per cent. present it paid to dig out every infected stool. Just dig it out and let it die. Some farmers in Mackay had completely rid themselves of Mosaic. He advised them not to grow Shajahanpur 10, and be careful of Black Innes. Q. 813 was highly resistant, though when it did get Mosaic it was very conspicuous.

Gumming Disease.

Any farmer on the Woongarra should know the symptoms of gum. The yellow streaks with red dots and dead patches would be shown to them—they could see them in the Badila on the Station—and the depth of the sticks which ooze a yellow gum from the cut ends was also well known. Gum would only be controlled by selection of healthy seed from clean fields, drainage, and the use of resistant varieties. Q. 813 was the best of these and possessed many good qualities—high c.c.s., good yield on the right soil, and high resistance to other diseases. From the pathologist's point of view it was the best resister they had, while farmers who were growing it extensively found it a splendid cane. It was a shallow rooter, however, and on sandy soils or in grub country Q. 855 should be tried.

Gum, however, was not usually prevalent on sandy country. Badila, N.G. 16, D. 1135, M. 1900 S., and H.Q. 285 were susceptible. The disease had the habit of appearing suddenly, causing heavy losses, and then disappearing again, so that farmers were inclined to regard it as a necessary evil. He suggested the replacing of the worst infected portions of fields by Q. 813, and then, by seed selection or, better still, by the importation of clean plants, the gradual clearance of the farm. They could plant Q. 813 and then replace it by another variety, putting Q. 813 in the next block, and so on. Leaf Stripe occurred slightly in a few areas. The symptoms were—

(1) The elongation of the stick.

(2) The light green or pale yellow stripes in the leaves which at first glance resembled Mosaic, but which were regular and not on the leaves of the spindle. Moreover, the striped areas later died and the leaf became shredded. At the back of the leaf was a white down which was the fruiting portion of the fungus, the spores of which were wind-borne. The disease could spread rapidly, so digging out of infected stools was essential. They should be burnt.

Fiji Disease.

Fiji disease was not yet in Bundaberg, but since he had gathered evidence which pointed to the fact that it can travel about 30 miles from the source of infection, it was as well they should know it. The symptoms were a dwarfing of the stool, dark green, short, and deformed leaves with lumps or galls on the backs thereof. These galls were light green or brownish in colour, and run along the leaf, being anything up to 1½ inches long. They were the first symptom of the disease, and might be seen on canes otherwise apparently healthy. There was a long incubation period, so this disease was impossible to detect in the early stages. He had brought specimens of the disease from Maryborough under strictly observed precautions, so that they could see what it looked like. Let them get rid of the diseased plants, use clean seed, and try Q. 813 as a resistant variety.

Iliau, peg leg or foot rot, leaf sheath fungus, and "X" disease were all regarded as soil troubles. The soil in the Childers district was very low in potash and phosphate, and was in many cases very low in humus and deficient in lime. The

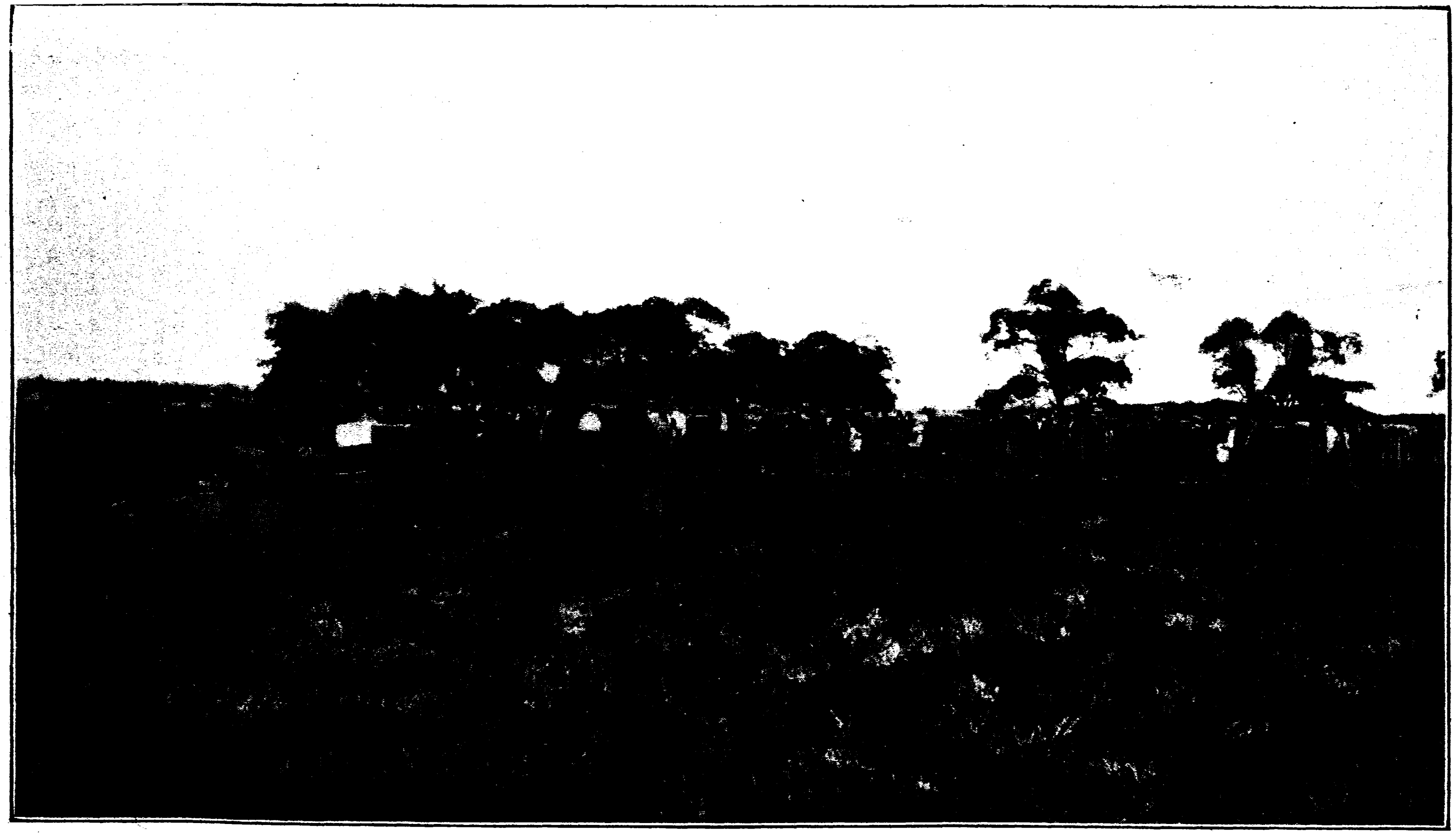


Photo.: W. J. Cunningham, Bundaberg.]

PLATE 5.—FARMERS' FIELD DAY AT THE SUGAR EXPERIMENT STATION, MARGAM, NEAR BUNDABERG, 28TH MAY, 1927.
A General View of the Gathering in the Power Farming Demonstration Area.

application of these with a good crop of giant cowpeas as often as possible would tend to diminish the loss due to these troubles. Soil was a big factor in cane-growing, and the neglect of it rendered them liable to diseases and diminished yield.

In Bundaberg the condition was not so acute, but potash phosphate and green manure were required. Iliau attacked the young cane, and bound the leaf sheaths with a dark fungus. Black fruiting bodies often appeared on the outside of the leaf sheaths. The growing tip would often twist on itself several times, and force its way out through the sheaths, often damaging itself, and dying in the process. Foot rot was also caused by a fungus, and affected M. 1900 S. and D. 1135 most of all. The cane fell over and lodged. Leaf sheath fungus bound the leaf sheaths of older cane, and often caused death.

Cane-Killing Weed.

Cane-killing weed had been seen around Bundaberg. It was a small weed with a purple flower, and was a parasite on the cane roots. Digging out was the remedy. In conclusion, Mr. Wood said that the golden rule of successful cane-growing was to plant their most healthy and best plants. This kept the cane from running out and was the best method of preventing disease. He advised them also to look to their soil. Impoverished soil meant weak growth, and a weak plant, as a weak animal, was the most favourable for a parasite to attack. If a man were run down he got diseases very quickly, and so did plants. The costs of cultivation were so high that it was imperative that the farmers and the Experiment Stations should pull together especially over diseases, and much could be accomplished. Every man could do his share and by degrees they should get complete control over all diseases as they had in Hawaii and other places. (Applause.)

CANE GRUBS.

Mr. W. R. Mungomery then addressed the gathering on entomological matters. He said that through one kind of grub appearing more or less always in the same district, sometimes to the total exclusion of the others, farmers occasionally expressed the opinion that there was only one cane grub, but at the outset he would like to dispel this common mistake, and have them understand that there were indeed several different species of very bad grubs, and each had its own peculiarities. He stressed the importance of differentiating between the various species of grubs commonly found in canefields, and justified the work of the entomologist, whose work in fighting those pests might appear to them somewhat vague and at times of no great importance, until they received a satisfactory explanation of the great issues involved, and they were then able to appreciate the reason for carrying out such work.

Sketching the history of the insect he said cane grubs, or ''white grubs,'' as they are more widely termed, are the larvæ or immature form of a family of beetles called the Scarabæidæ. All were familiar with these beetles, most of which emerge after a rainy period about Christmas time. These beetles, like most other insects, lay eggs, and these eggs, on hatching, produced tiny grubs. The grub period is the longest, and it is then that the damage occurs, the destructive period continuing until the grub is full-fed, and eventually turns into the pupa, and later into the beetle stage.

During their life as a grub, they are located in the ground, generally far from right near the surface to as deep as about 15 inches (sometimes deeper, but usually between these limits), and, feeding as they do on organic matter, they eat rather indiscriminately from the roots of most kinds of grasses and other herbage, whilst others again live on the decaying vegetable matter, or humus, which is always present in the soil. In all cases, they pass enormous quantities of soil through their bodies while feeding. So, on the one hand, we get the kind of grub which eats sets, young roots, and the underground portion of the cane plant, and in time they weaken or kill it. To this class belong the greyback grub, in North Queensland, and the *Trichosterna* and *Furfuracea* grubs in our districts, the *Frenchi* grub being found right along the coastal sugar belt of Queensland.

On the other hand, one frequently met with other species of white grubs in compost heaps, in places where stale chop-chop has been dumped, and also in manure heaps. Some of these grubs are very large, and growers often have the idea that they are the ordinary cane grub, particularly well fed, and living under ideal conditions. Such an assumption is erroneous, for they are totally different, and belong to other genera, including such species as the well-known black elephant beetle and the smaller reddish-brown Isodon beetle. Both of these grubs occur regularly in such situations, and sometimes the canefields where these manures have been dumped, but they do very little damage (if any at all) to cane, and they cannot be included in the list of serious cane pests for that reason.

Coming back to the family of beetles like the greyback and Frenchi of Melonthidæ, as they are technically called, we get beetles and grubs which are closely related, and all of which have very similar feeding habits, but their relative size is of great importance, for whereas the greybacks do a great amount of damage owing to their great size and the rapidity of their growth, other species, such as Frenchella, being small and scarce, do practically no injury to cane, although they are found in canefields.

From the great differences in the sizes of beetles and their corresponding grubs, it would be clearly understood that for the layman it becomes exceedingly difficult for him to distinguish between the large or old grubs of a small species and the small or young grubs of a large species.

Rather fortunately for us each grub has some little distinguishing characteristic, which we are able to pick out. Sometimes this is in the shape of the jaws or mandibles, or sometimes in their feelers, or antennæ, but more often we have to rely on the shape or arrangement of certain hairs with which the body of the grub is covered, and by these means the entomologist is able to identify the grub.

Further, by carefully studying their habits, he is soon able to tell whether the grubs are root feeders, or whether they live on decaying vegetable matter, and so he is able to convey to the farmer the results of his experience, and tell him whether any of the grubs on his farm are likely to prove troublesome, or whether he need no longer worry about them. Also, he is able to state from his knowledge of the life cycle of the species in question whether at that particular time grubs are likely to occasion further damage, or whether they are full-fed and ready to go down deeper into the soil and pupate, and then their period of destructiveness would be at an end.

Knowledge Necessary.

Thus, continued Mr. Mungomery, one sees why it is most essential to know the various grubs that are present in a district, for without a perfect knowledge of their habits, one has merely to chance whether they will become destructive or not, and this is very unscientific. Moreover, it does not follow that because a farm has been free from grub attack for a great number of years it will always remain immune from their attacks. An instance of this occurred this year in the Bundaberg district, when one farmer suffered his first experience with grubs, after being on the same farm for twelve years.

On the table in the grounds a collection of insects was displayed, which comprised preserved specimens of grubs and other sugar-cane pests, as well as specimens of other closely allied insects which were likely to prove of interest. These he asked growers to inspect, and become familiar with them. In conclusion, he urged farmers to make use of the Entomological Laboratory. (Applause.)

Mr. T. Dexter moved a hearty vote of thanks to Mr. and Mrs. Pringle, Mr. H. T. Easterby, and the other speakers for the arrangements made for the day and also for the speeches, and this was carried by hearty acclamation. Mr. Easterby acknowledged the compliments paid.

An exhibit which commanded considerable attention was that provided by the Bureau offices, showing the different cane beetles, grubs, and other pests which did damage to the crops. The parasites which preyed upon these insects were also displayed in the collection. The exhibit also included samples of diseased cane, and altogether it was instructive, and was duly appreciated by the farmers.

A power farming demonstration, and also an effective display of the features and field work of modern farming implements, concluded a very successful day.

WOULD NOT BE WITHOUT THE JOURNAL.

A Kandanga subscriber renewing his subscription writes (26*th May*, 1927): *"Thanking you for the Journal in the past. I would not be without it." Writing from Warra* (30*th May*, 1927), *another says: "We much appreciate the help you are giving to men on the land."*

SPOTTED WILT OF TOMATOES.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

During last season a disease previously unrecorded from this State came under notice as causing considerable loss to tomato growers in some localities. This disease first appeared in Victoria, in the 1915-1916 season, and was later fully described by C. C. Brittlebank, who named it "Spotted Wilt" on account of its characteristic symptoms. It has now been reported from all the Australian States. In Queensland the disease has so far been definitely noted only in certain tomato-growing districts in the vicinity of Brisbane, but it probably also occurs at Maryborough. The amount of loss sustained varied on different farms from an odd plant to 50 per cent. of the crop.

Description of Characteristic Symptoms.

Affected plants can often be picked out on account of their tendency to produce an attenuated new growth—the young leaves of one or more branches remaining narrower than normal, and at the same time becoming curled around the mid rib, giving the branch somewhat of a drooping appearance. These symptoms, however, may be induced by certain other diseases, and the characteristic symptom of Spotted Wilt is the appearance on the leaves of numerous small brown spots, which produce in the early stages a distinct mottled pattern. These spots are more or less circular in shape and vary in size from minute dots up to about one-eighth inch in diameter. They are variously scattered on the upper and sometimes the lower surface of the leaf between the main veins (see Plate). The younger leaves situated towards the outer ends of the branches are usually the first to show this marking. The spots if numerous may coalesce, and the surrounding tissue then gradually turns yellow and dries out so that the leaf presents a withered appearance. Dark-brown surface streaks usually linear or broadly linear may occur on the leaf stalks and stems. On scraping, this discoloration will be seen to be restricted to the surface layer of cells only. In some cases the fruit may show brown to blackish greasy-looking markings of varying extent which do not usually penetrate the flesh for any great distance. The symptoms may appear on from one to all the branches. In the latter case the plant will finally present the appearance of complete wilt—a condition which is sometimes assumed very rapidly. Very vigorously-growing plants are perhaps the most affected.

Spotted Wilt in its later stages, when the leaves are all dead and drying, may be distinguished from the common Fusarium Wilt by the absence of the brown fungus-invaded patches of large-celled conducting tissue, which are seen in the case of the latter when the lower portion of the main stem is cut across.

Cause of the Disease.

Repeated attempts have been made by workers in the Southern States to find a fungus or bacterial parasite which might be the cause of Spotted Wilt, but without success. In the absence of a definite parasite of this nature the disease differs from most common tomato troubles. Spotted Wilt is probably similar to an American tomato disease known as "Streak," which has been shown lately by T. C. Vanterpool to belong to the virus type of disease. In this type are grouped a number of diseases presenting certain points of similarity,

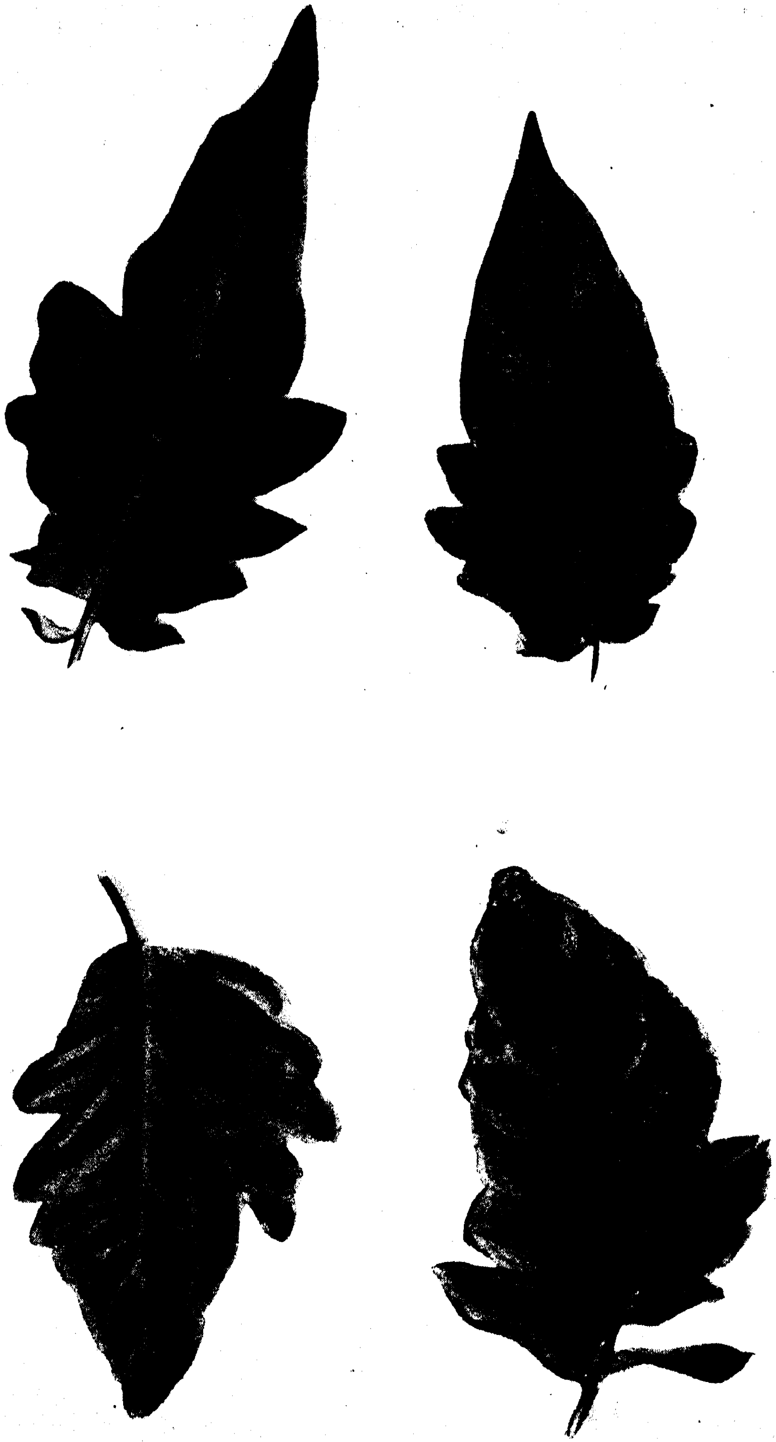


PLATE 6.—LEAFLETS FROM A TOMATO PLANT AFFECTED WITH SPOTTED WILT.
From a water-colour drawing by I. W. Helmsing, of the staff of the Chief Entomologist.

but whose causal agents are so minute that there has so far been developed no means of viewing them with certainty. What little is known about these organisms has therefore to be inferred from the reactions obtained in various experiments with the plant juice in which they have been shown to occur. It is probable that in the case of Spotted Wilt certain sucking insects which feed on the tomato are able to spread the disease by transferring juice containing the causal agent or virus from an infected to a healthy plant.

Control.

No certain means of control has yet been demonstrated. Spraying with a fungicide is of no avail on account of the nature of the disease. As an affected plant may harbour the virus with which healthy plants can be inoculated, such sources of infection should be kept to a minimum. The following recommendations are designed to reduce the loss due to this wilt:—

1. Pull up and burn any diseased plant as soon as it appears. A regular inspection of the plot should be undertaken at frequent intervals for this purpose. It is not sufficient to remove a single branch because this is the only one bearing symptoms, since the rest of the plant may be harbouring the infectious agent even though not showing signs of disease. Unfortunately, under certain conditions the plant may be a bearer of the virus without displaying the usual symptoms. This, however, should not be used as an argument for neglecting systematic destruction.

2. Spray with a contact insecticide for the control of sucking insects which may be agents in the dissemination of the disease.

3. Avoid excessive use of strong nitrogenous manures which tend to make the plant more susceptible by producing excessively vigorous succulent growth.

4. Clean up and burn the remains of the crop as soon as it has ceased to be profitable, as an odd infected plant left over from crop to crop may be the means of perpetuating the disease. This precaution will also help to control the various fungus diseases of the tomato.

A BUNDABERG FARMER APPRECIATES THE JOURNAL.

A Yandaran subscriber: "Although but a comparatively recent subscriber and reader of the 'Queensland Agricultural Journal,' I am a most enthusiastic supporter of it.

"When anything with which the Department is connected goes amiss there is enough noise to hearten a Chinese army for battle, but when things are O.K. no one thinks it worth while to utter a word of commendation. Honour to whom honour is due! The Journal is a very distinct credit to the Department and its officers, and, if paid for on the basis of valuable information gleaned therefrom, would be beyond the financial means of most of us to purchase. Wishing you and the Journal continued and well-merited success."

Man News

A LONG SERVICE WORK BOOT

EMBASSY WORK BOOTS

The "Worker" WORK BOOT

17/6 PAIR

A great Boot for Farmers—Cigar Workers—Navvies—and those occupations requiring a strongly constructed Work Boot. Made of heavy Chrome Leather—Double weight leather Soles, and watertight Tongue. Wax thread stitched and finished with Brass Screws, Eyelets, Slugs. Has Solid Leather Heels. Easily the best value offering at this figure. All sizes. Order to-day. Tan or Black.

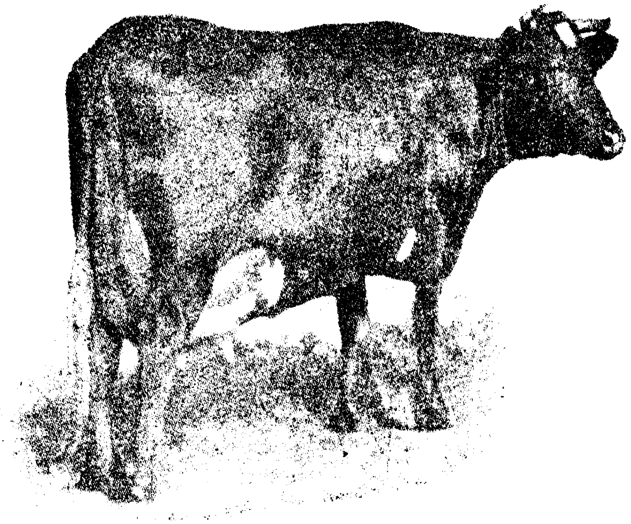
Pike Brothers

LIMITED

In Queen Street, Brisbane

Postage Extra

Mail to Desk **AJ**



Melba XV of Darbalara (4188). Bred by and property of The Scottish Australian Investment Co. Ltd., Darbalara Estate, Gundagai. By Kitchener of Darbalara (419) ex Melba VII (4181). Champion butter producing cow of the World of all breeds. Produced 32,522 lb. milk, 1,614 lb. fat in 365 days from July, 1923, to June, 1924.

"I have no doubt that Cottonseed Meal is a valuable adjunct to include in ration of concentrated food for heavy producing cows."

Extract from letter of Manager of Darbalara Estate.

Bacal Cottonseed Meal

(Made in Queensland from Queensland Grown Cotton Seed.)

The Finest Milk Producer Known
The Richest and Most Economical
CHEAPEST AND BEST

J. K. Murray, B.A., B.Sc. (Agr.), N.D.D., Principal Gatton Agricultural High School and College, in his lecture broadcasted by 4QG, after pointing out the essential necessity of proteins for dairy cows, concluded: "Cottonseed Meal is the cheapest protein concentrate on the market, and is manufactured in Queensland."

SOLE DISTRIBUTORS:

Arthur Vale & Co. Pty. Ltd.
Ryan House, Market St., Brisbane

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING MAY, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1927.	May, 1926.
North Coast.	In.		In.	In.
Atherton	1·98	26	0·81	0·51
Cairns	4·49	45	1·10	1·47
Cardwell	3·57	53	0·26	0·29
Cooktown	3·03	51	0·45	0·73
Herberton	1·64	40	0·58	0
Ingham	3·42	35	1·58	0·25
Innisfail	12·34	46	9·82	1·08
Mossman	3·69	14	1·12	0·11
Townsville	1·33	56	0·03	0
Central Coast.				
Ayr	1·13	40	0	0
Bowen	1·30	56	0·11	0·08
Charters Towers ...	0·78	45	0	0·18
Mackay	3·81	56	0·59	0·57
Proserpine	4·63	24	0·48	0
St. Lawrence ...	1·80	56	0·08	0·38
South Coast.				
Biggenden	1·82	28	0·13	1·20
Bundaberg	2·76	44	0·18	9·95
Brisbane	2·81	76	0·02	1·27
Caboolture	2·92	40	0	3·05
Childers	2·25	32	0·10	4·58
Crohamhurst ...	...	35	...	5·37
Esk	2·03	40	0·02	0·80
Gayndah	1·57	56	0	3·93
Gympie	2·96	57	0·16	2·57
Kilkivan	1·89	48	0·11	1·29
Maryborough ...	3·18	55	0·12	9·64
South Coast— continued:	In.		In.	In.
Nambour	5·02	31	0·06	5·89
Nanango	1·55	45	0	0.34
Rockhampton ...	1·50	40	0·09	1·42
Woodford ...	2·95	40	0	1·65
Darling Downs.				
Dalby	1·34	57	0	1·18
Emu Vale ...	1·17	31	0	0·65
Jimbour	1·23	39	0	0·88
Miles	1·55	42	0	3·61
Stanthorpe ...	1·91	54	0·14	0·85
Toowoomba ...	2·22	55	0·08	1·43
Warwick	1·57	62	0	1·01
Maranoa.				
Roma	1·48	53	0·06	4·59
State Farms, &c.				
Bungeworgorai ...	0·59	12	0·04	4·45
Gatton College ...	1·70	27	0·03	0·44
Gindie	0·99	27	0	0
Hermitage ...	1·26	20	0	0·86
Kairi	1·99	12	*	0·03
Sugar Experiment Station, Mackay	3·44	29	1·13	0·53
Warren	0·95	12	0	1·12

* Return not received.

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

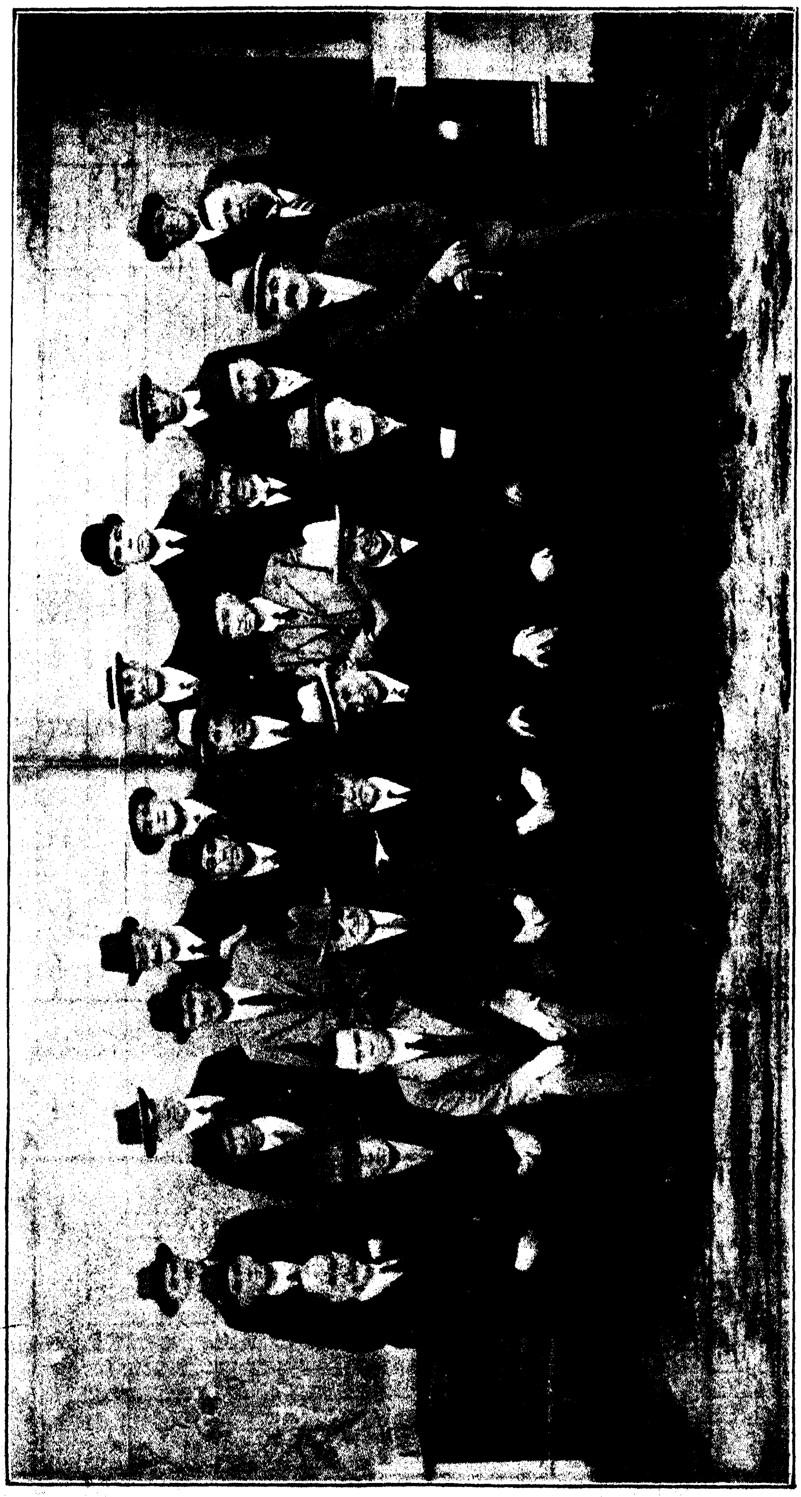


PLATE 7.—MINISTERS OF AGRICULTURE IN CONFERENCE.
Delegates to the Conference of Ministers of Agriculture at Adelaide.
(For Key to Group, see page 33.)

AGRICULTURAL PROBLEMS.

INTERSTATE CONFERENCE AT ADELAIDE.

INTENSIVE SETTLEMENT AND WHITE AUSTRALIA.

The Annual Interstate Conference of Ministers of Agriculture and their officers was opened by His Excellency the Governor of South Australia (Sir Tom Bridges), at Adelaide, on Monday, 23rd May, and was continued on following days. All States were represented, and the South Australian Minister (Hon. J. Cowan) presided. It was stressed that wrapped up in the development of agriculture was the White Australia policy, and the liquidation of Australia's national debt. Subjoined is an abridged report of the proceedings, which will be read with interest by Queensland farmers.

Delegates to the conference were:—New South Wales—Minister for Agriculture (Hon. W. F. Dunn), Under Secretary for Agriculture (Mr. G. D. Ross), Fruit Expert (Mr. W. J. Allen), Dairy Expert (Mr. L. T. McInnes), Secretary to the Ministry (Mr. H. Luckman). Victoria—Director of Agriculture (Dr. S. S. Cameron), Superintendent of Exports (Mr. R. Crowe), Director of Horticulture (Mr. J. M. Ward), Chief Veterinary Officer (Mr. E. A. Kendall), Ministerial Secretary (Mr. J. Thynne), and Messrs. Meeking and Brown. Tasmania—Director of Agriculture (Mr. F. E. Ward); Fruit Expert (Mr. P. H. Thomas); Dairy Expert (Mr. T. H. Atkinson). Queensland—Under Secretary for Agriculture (Mr. E. Graham), and Mr. R. P. M. Short. Western Australia—Honorary Minister (Hon. H. Millington), Director of Agriculture (Mr. G. L. Sutton), Superintendent of Horticulture (Mr. G. W. Wickens), Superintendent of Dairying (Mr. P. G. Hampshire). South Australia—Minister for Agriculture (Hon. J. Cowan), Secretary (Mr. W. L. Summers), Director (Professor A. J. Perkins), manager, Government Produce Department (Mr. G. A. W. Pope), Chief Inspector of Stock (Mr. C. A. Loxton), Horticultural Instructor (Mr. G. Quinn), Chief Dairy Instructor (Mr. H. B. Barlow), Poultry Expert (Mr. D. F. Laurie).

Hon. J. Cowan (South Australia) presided.

The Minister expressed pleasure that the Hon. W. F. Dunn (Minister for Agriculture, New South Wales) and the Hon. H. Millington (Honorary Minister, Western Australia) were present, but expressed regret that the Hon. W. Slater (Minister for Agriculture, Victoria), Hon. J. Belton (Tasmania), and the Hon. W. Forgan Smith (Queensland) had not been able to attend that day.

KEY TO GROUP (See Plate 7).

Top Row (standing) : Messrs. W. L. Summers (Secretary to the Minister, South Australia), J. M. Ward (V.), R. Crowe (V.), P. H. Thomas (T.), G. W. Wickens (W.A.), P. G. Hampshire (W.A.), Neale (V.), Davis (Chairman of Dried Fruits Board, W.A.).

Middle Row (standing) : Messrs. Atkinson (V.), L. McInnes (N.S.W.), H. B. Barlow (S.A.), G. A. W. Pope (S.A), R. P. M. Short (Q.), W. J. Allen (N.S.W.), H. Luckman (N.S.W.), G. L. Sutton (W.A.), L. S. Smith (S.A.).

Seated : F. E. Ward (T.), E. Graham (Q.), G. D. Ross (N.S.W.), Hon. W. F. Dunn (N.S.W.), Hon. J. Cowan (S.A., Chairman), Hon. H. Millington (W.A.), Dr. S. S. Cameron (V.), Professor A. J. Perkins (S.A.), G. Quinn (S.A.).

The Hon. W. Slater, the Victorian Minister, had not arrived.

OPENING ADDRESSES.

Agriculture and the Empire.

His Excellency the Governor (Sir Tom Bridges), in declaring the conference open, said the delegates could do a great deal in forwarding agricultural development at the present time by exchanging views and experiences. It was of the highest importance of all States that they should get together on questions of agriculture and pastoral development, not only from the point of view of the States and the Commonwealth, but also from the point of view of the Empire. In Australia there were millions of acres of land, and in Great Britain there were thousands of people who should be on the land and helping to develop the resources of the Empire. There was no doubt that the question of the White Australia was bound up with the question of agriculture. That would be ascertained when they got into close touch at the conferences of the League of Nations. The question of a White Australia was always cropping up, and it had to be held down sometimes by force. It was a most difficult question, as they had a great many colleagues in the League of Nations who did not see why Australians should have such a great continent to themselves. Some of them were not of the same colour as Australians. Any steps made to increase the number of people on the land was a step forward in the solidity of the Empire and keeping a hold on Australia. He was pleased that the conference had been opened under such auspicious circumstances. A few days ago it appeared as though South Australia was in for a bad season, but now they were in a favourable position, and if they received rain over the pastoral areas they would be "in clover," as they had practically been since 1914. He felt that agriculture was the dominant economic interest of Australia to-day. The total production of wealth from all sources in 1925 was £449,000,000, of which £274,000,000 was contributed by agricultural and pastoral interests. Those figures spoke for themselves. It seemed to him that there were two methods available for increasing agricultural production. One was favourable legislation, and the other the application of science to production. He did not profess to be an agriculturist himself, but he had travelled a great deal about Australia, and he had always been struck by the fact that things needed speeding-up if they were to keep their place in the world's market. They had to cut their costs of production and introduce scientific methods. Those were the most important things that faced them to-day. He hoped their conference would be crowned with success, and that they would enjoy their stay in Adelaide.

Science and Increased Yield.

The Premier (Hon. R. L. Butler), in moving a vote of thanks to His Excellency, said the States of Australia were fortunate in having vice-regents who took an interest in agriculture and every other production that made for the welfare of the community. His Excellency realised that wrapped up with the question of agriculture were immigration and their great ideal of a White Australia. The latter could only be maintained by developing and populating the country with white people. He extended a welcome to the delegates from the other States, and said the application of scientific methods to agriculture was not only going to make for increased yield per acre, but was going to enable every State to open up and develop land previously thought useless. The conference, with its interchange of views, would assist materially in the carrying out of a progressive agricultural policy. The South Australian Government would at all times give serious consideration to the decisions of the conference. Their future was wrapped up in agricultural pursuits, as 98 per cent. of their exports were primary products. Although they realised the importance of secondary industries it was only by increasing production that they could pay their debts and fulfil their obligations to Great Britain.

Mr. Dunn (N.S.W.) seconded the vote of thanks, and said he was pleased to find that His Excellency was in accord with the views of his predecessor (Sir Archibald Weigall), who took a great interest in agriculture. They appreciated that representatives of the King took such a deep interest in the problems of Australia, and they expected His Excellency when he returned to be an ambassador for the Commonwealth. He (Mr. Dunn) realised that they must populate and extent their agricultural pursuits, if they wanted to "hold down" their ideal of a White Australia.

Mr. Millington (W.A.), who supported, said no Government would be fit to hold office if it did not do its utmost to promote the interests of agriculture. Western Australia was making rapid strides, and if he were asked for a reason for that he would say that apart from the enterprising people who worked the land it would be the application of up-to-date and scientific methods to the agricultural industry. To-day they were concentrating on greater production per acre, and in Western Australia they had now reached the 30,000,000 bushel mark. The wool clip was increasing, and in the fruit industry the production per acre in each district had increased not only in quantity, but in quality.

CONFERENCE PROCEEDINGS.

The Chairman, in welcoming the visiting delegates, expressed the hope that the conference would be profitable. He was proud of the work the department was doing in this State, and what had been done in the past would be excelled in the future. They were proud of the Waite Research Institute—a noble gift by the late Mr. Peter Waite, whose memory they reverenced. It would open up immense possibilities not only for the State, but for the Commonwealth.

On the motion of the Hon. W. F. Dunn (N.S.W.), the following committees were appointed to deal with the various subjects, with instructions to report at each day of the conference:—(1) Heads of departments, (2) dairy experts, (3) fruit experts.

Inspection of Exports.

Mr. Dunn (N.S.W.) introduced the question of the inspection of local produce prior to export. He said Commonwealth and State officials inspected goods before export. When in England he saw produce inspected by eight officials upon arrival. That was unnecessary overlapping. It was a Commonwealth matter, but the States were vitally interested. There were no inspectors in California. The exporters were licensed, and if the goods they sent abroad were not up to standard their licence was cancelled, and their bond estreated. It was only rarely that adverse reports on exported produce were received. The conference might consider it advisable to recommend something to the Federal authorities, and to secure fuller details of the Californian system, with a view to adopting a similar system in Australia. During the war canned goods in a faulty condition were sent to Great Britain, and Australia had not yet recovered from the harm those goods had caused to its reputation.

Uniformity Needed.

Mr. Millington (W.A.) agreed it was imperative that Australia should have a uniform system of inspection, and a most rigid one. Their reputation depended on the quality of goods exported. In the absence of an effective system it was bad business to export goods not up to standard. Anything to make the inspection more effective should have the approval of the conference. In India, because of climatic conditions, rust set in among tinned fruits, and steps should be taken to guard against this. If a hallmark were set upon Australian exports the overseas demand would soon increase.

Dr. S. S. Cameron (V.) supported, and said in California the fruit came to the exporters in very uniform grade, and there was little trouble. The keypin of the industry was the country packing shed. If a member of the Californian Packing Association failed to pack to standard he was expelled from the association, and then had to send his fruit to the brokers in Chicago, and be subject to victimisation. Members were therefore glad to get back into the association. Unless there were packing sheds in every district they would have to depend on inspection by the Governments.

Mr. Ward (T.) said he was pleased the subject was being ventilated, as there was constant friction between State and Commonwealth inspectors in Tasmania.

The Chairman said a great problem was to secure uniformity in packing and grading. Although they had an unnecessary number of inspectors, fault was still found in the products upon arrival in London. That apparently proved that the system was not efficient.

Mr. Ward (T.): There is war between the grower and the inspector.

The Chairman said the Californian system commended itself to many. It made the exporters responsible and eliminated the inspectors, which would tend to economy. They should direct the attention of the Federal authorities to the overlapping and to the system prevailing in California.

Mr. Graham (Q.) supported, and said the responsibility of the exporter at present seemed to be in obtaining a certificate.

Mr. Pope (S.A.) said the Government were asking the producers to organise as they did in California, and were offering an Export Control Board. Improvement in the quality of fruit sent overseas could only be obtained by growers organising and insisting that only the best quality fruit should be sent overseas.

Mr. Dunn moved:—"That the conference is of opinion that the present system of inspection has proved unsatisfactory and inefficient, and desires to direct the attention of the Commonwealth authorities to the necessity of ensuring that greater responsibility is taken by the exporter for the quality and grade of produce exported by him."

Mr. Ward (T.) seconded. Carried.

On the motion of Mr. Millington (W.A.) it was decided:—"That the State authorities be urged to popularise the adoption of improved methods of preparing and grading for market on lines similar to those which have proved satisfactory in other countries, with the object of making the exporters carry the full responsibility for the quality of produce exported."

Overseas Representation.

Regarding representation at overseas conferences, Mr. Dunn (N.S.W.) suggested that on the score of least expense one member should be selected to represent the whole Commonwealth; and that the Federal Government be asked to pay his expenses. If it did not agree, each State could contribute its portion.

Dr. Cameron (V.) concurred. He said since the war a lesson had been learned of a "get together move." It was vital to the progress of the Empire. Exchange of views was most desirable in primary and secondary industry, and in regard to scientific methods. Governments had been anxious for Australia to take its proper place in these conferences, but the question of expense had always debarred representation. If the Commonwealth would not provide the funds, the States should contribute on a population basis to send a delegate.

Mr. Millington (W.A.) said where the Federal Government had to foot the bill it would require the choice of a delegate. They would lose the control of securing a verbal report from the delegate, which was often more valuable than his written report. It was unsatisfactory to lean on the Commonwealth, and the States should make an effort to contribute, and select a delegate.

Mr. Dunn moved:—"That the conference considers it desirable that Australia should be represented at important oversea conferences dealing with agricultural matters, and that the State Governments be asked to co-ordinate with the Commonwealth with a view to selecting a representative, and that the States' contribution towards financing the expenses of the delegate be raised on a population basis, the selection of such representative to be determined by the State Ministers of Agriculture."

Conference decided that the Federal Government should be approached on this matter.

Rural Credits Scheme.

Mr. Graham (Q.) introduced the question of widening the scope of the Commonwealth Rural Credits scheme to provide finance for marketing and kindred activities. He said it was desirable that greater facilities be given. Finance was essential for the establishment of marketing boards, and must be available if boards were to function satisfactorily. The existing limit of twelve months was too short.

Mr. Millington (W.A.) said it would be preferable to ask the Federal Government to remove the limitation of a year. Better terms were desirable.

It was agreed to approach the Commonwealth Government.

Broom Millet.

Mr. Graham (Q.) moved for the maintenance of the embargo upon importation of broom millet. It had been said that the Australian production was inadequate for requirements, but it was not now the case.

Mr. Dunn (N.S.W.) seconded, and said the embargo was introduced to prevent the introduction of the pest European cornborer.

Mr. Millington (W.A.) wanted an assurance that the Australian States produced sufficient for requirements. It appeared to him that the motion was for spoonfeeding the industry.

Dr. Cameron (V.) said the question was not introduced for trade interests, as had been suggested.

The following motion was carried:—"This conference desires to intimate to the Commonwealth authorities that the assurance given by the States that sufficient broom millet would be produced in Australia for local requirements has been fulfilled, and the quantities produced this year will meet the stated requirements of manufacturers; further, this conference desires to emphasise the necessity, in view of the danger of introducing the European cornborer, of maintaining the embargo on the importation of broom millet.

Fodder Conservation.

It was decided that the matter of fodder conservation by the direct effort of the stockowner seems, in the light of present knowledge, to be the only practicable means of conserving adequate supplies of fodder to combat drought conditions.

Council of Research.

Professor A. J. Perkins (S.A.) favoured co-operation between the agricultural authorities and the Commonwealth Council of Scientific and Industrial Research. He said the main proposal was that the council should take part in agricultural research to assist industry. He moved that the conference endorses the agreement recently reached by heads of Departments of Agriculture and the Council of Scientific and Industrial Research relating to the prosecution of agricultural research by the latter body, and approves of payment to the council.''

Mr. Dunn (N.S.W.) seconded, and the motion was carried.

Wild Dog Scalps.

Mr. Millington (W.A.) moved for the payment of a uniform bonus throughout the Commonwealth for the destruction of wild dogs in order to prevent trafficking in scalps. There was no doubt, he said, that trafficking would take place if there was sufficient inducement. Western Australia paid £2 a scalp, and the Northern Territory only 5s. a scalp.

Mr. Dunn (N.S.W.) said there were about sixty vermin districts paying varying rates in New South Wales. Although he did not oppose a uniform rate, he thought it impossible to put it into effect.

The Chairman said if £2 or £3 a head was paid for scalps, it would pay better to breed dogs than sheep. South Australia could not pay anything like the same rate as Western Australia and New South Wales.

Mr. Millington asked leave to withdraw the motion to make it the subject of negotiations between the States concerned and the Commonwealth.

Tubercular Cattle and Blood Stock Concessions.

On behalf of Victoria, the Director of Agriculture of that State (Dr. S. S. Cameron) introduced the subject of State Government administrative control of pleuro-pneumonia, and the influence of the Cattle Compensation Act in Victoria.

Dr. Cameron said Victoria was handicapped by the lack of uniformity in the control of disease in neighbouring States. However strictly Victoria might deal with the position, it was affected from time to time by fresh doses from over the borders.

Mr. E. A. Kendall (Chief Veterinary Officer of Victoria) said Victoria opposed the suggested reduction of from ninety to sixty days with respect to the period of quarantine of affected animals. Indeed, it was questionable whether niney days was sufficient. Not all the stock attacked by the disease died from it, and might recover unobserved by the person in control. That was where the risk was mainly run. It was no exaggeration to say that the only really safe method of dealing with the disease was to totally destroy affected herds. That, however, might be too severe in some cases, and should only be insisted upon where a big percentage of a herd was affected, or where there had been an outbreak in existence for some time before control was begun. Victoria felt that the other States should do something to fall into line with Victoria.

Dr. Cameron added that the operation of the Cattle Compensation Act had proved a distinct success in his State. The fund was subscribed to by stockowners, and the Government contributed 40 per cent. of the compensation for tuberculosis. The introduction of a compensation fund would be a really good thing, and would reflect credit upon the Governments of all the States.

The Chief Inspector of Stock and Chief Veterinary Surgeon for South Australia (Mr. C. A. Loxton) said such a fund would be of great benefit in dealing with the disease, but South Australia was largely importing cattle, chiefly from Queensland. While agreeing with Dr. Cameron's remarks, he felt that the absence of such an Act in South Australia did not prejudice other States.

The Hon. H. Millington (Hon. Minister for Western Australia) pointed out that there was no tuberculosis among cattle in his State, except a little in the north-west. Western Australia had adopted rigid measures to prevent the introduction of diseased stock to the State.

The Minister of Agriculture for New South Wales (Hon. W. F. Dunn, M.L.A.) said he could not promise that his Government would introduce an Act such as suggested, because his State sometimes suffered from outbreaks of anthrax and other troubles, and the Government could not bring in a measure which would benefit only those stockowners whose cattle were suffering from a particular disease. His Government, however, opposed any reduction in present restrictions for dealing with the disease. The matter was serious, and experience might show that present conditions should even be tightened up.

The Under Secretary for Agriculture for Queensland (Mr. E. Graham) said the disease was Australian-wide, and any means of coping with it must also be Australian-wide, and operate uniformly in all the States.

The Minister of Agriculture for South Australia (Hon. J. Cowan) said he had been much impressed with the methods of compensation adopted in Victoria, and would give serious consideration to the possibility of introducing a similar measure for South Australia. There were difficulties, he knew, such as the compensation of owners of cattle only recently introduced to the State.

There was no opposition to the following motion by Dr. Cameron:—"That it be a recommendation that the method of control of contagious pleuro-pneumonia in cattle should be based on the recognition of the fact that all animals which recover from the disease are carriers of the disease, and a potential source of further outbreak."

Mutton Export Trade.

The manager of the South Australian Government Produce Department (Mr. G. A. W. Pope) moved—"That, in view of the effect on the mutton export trade of the British regulations prohibiting the importation of carcases with the lymphatic glands removed, it is desirable that the veterinary staffs of the States interested should co-operate in assisting research work now being carried out, with a view to preventing possible infection, and also curing the disease."

Mr. Dunn urged that the Commonwealth Government should get into touch with the Port of London authorities and endeavour to secure the removal or modification of the regulations. The embargo on Australian growers did not prevent infected mutton from other countries being placed on the London market.

Dr. Cameron said there was no scientific justification for the restrictions, as the ailment was not communicable to humans, and when the enlarged or discoloured gland was removed the carcase was no less fit for food than if a scar or cut left by a shearer was sliced off by the butcher.

Mr. Pope's motion was agreed to, as was also the following:—"That the Commonwealth Government be asked to again urge on the Port of London authority that, as this trouble exists in both England and Scotland, and is not communicable to man, the regulations prohibiting the import of carcases of sheep with the lymphatic glands removed should be relaxed."

Importation of Blood Stock.

The question of concessions in the importation of stud stock from Great Britain was raised by Mr. Dunn. Some of the shipping authorities, he said, had been opposed to carrying stock free, but he had met all the authorities recently in conference, and they had agreed that if the Federal Government paid one-third of the total cost of transportation from the farm in Britain to the farm in Australia, the shipping companies would charge no freight on stud stock. The shipping companies were anxious to encourage the production of better stock, feeling that it would mean more trade for them later on. The British Government was not averse to the scheme, and the idea was that the Government should pay one-third, the Commonwealth one-third, and the State concerned one-third after the stock was purchased. In agreeing to this scheme, however, the shipping companies were averse to encouraging mere speculators. It was desired to help only genuine buyers.

Mr. Dunn moved—"That this conference requests the Commonwealth Government to co-operate with the Imperial and State Governments and the shipping companies in assisting stockowners to import approved stud stock from Great Britain on the following suggested conditions:—The stockowners to bear the cost of purchase, the shipping companies to transport the stock free of freight, all additional charges, including rail freights, fodder, quarantine, &c., to be defrayed by the Imperial, Commonwealth, and State Governments concerned in equal proportions."

This was carried.

Plant Pathology and Grain Pickling.

The following recommendations of the committee, consisting of the heads of departments of the various States, were adopted:—

"That a conference of plant pathologists should be held periodically to discuss problems arising out of the occurrence of plant diseases, and that the heads of technical branches in the various States should meet at different times on the condition that it could be shown that there was need for such conferences.

That although work in connection with uniform standards for copper carbonate and other compounds for dry pickling of grain was not sufficiently advanced to admit of the fixing of definite standards, the work should be continued.

That a list of names proposed for new wheat about to be placed on the market should be forwarded to the Department of Agriculture of each wheat-growing State, and subsequently be brought up at the conference of Ministers of Agriculture for confirmation.

That the attention of the Commonwealth Government should be drawn to the fact that no action had been taken relative to the issue of regulations governing the grading of eggs intended for export.

That the departments concerned should enter into negotiations with a view to having official egg-laying competitions conducted under uniform regulations throughout the Commonwealth.

That the Departments of Agriculture should take steps to bring about a uniform or standard method of (*a*) classification of soils in connection with soil surveys; (*b*) determining the acidities of soils; (*c*) testing lime requirements of soils; (*d*) analysing pest destroyers.

That mesh sieves in use in Departments of Agricultural laboratories should be the standards of the Institute of Mining and Metallurgy.

Dairy Matters.

The dairy committee furnished a report in which it stated that attention had been given to the decisions of the previous conference (held at Brisbane). It was pointed out that the resolution on that occasion, referring to the advisableness of sending an officer overseas to investigate dairy matters, had not been given effect. The committee again recommended that the matter should be urgently attended to, and that the rotation of representation should be in accord with the volume of production in each State. In regard to the appointment of a joint committee representing New South Wales, Victoria, and Queensland, it was considered that if the joint committee investigated the efficiency of dairy machinery and reported upon it to all the State Departments, it would prove a useful guide. It was recommended that the joint committee should consist of he dairy experts of the States mentioned, and that it should meet at an early date.

All the recommendations were adopted.

Cheese Standards.

In a further report dealing with items set down on the agenda of the 1927 conference, the committee stated that it unanimously agreed that the following cheese standards should be adopted in State legislation, and that it should be a recommendation to the Commonwealth authorities for adoption:—

"Cheese shall contain no fat other than butter-fat, nor preservatives or any foreign matter other than rennet or salt, and only such colouring matter as, in the opinion of the Minister, is harmless, and shall comply with the following conditions:—

"Cream cheese shall contain not less than 50 parts per cent. butter-fat, and not more than 30 parts per cent. water.

"Whole milk cheese shall not contain less than 50 parts per cent. butter-fat in its water free substance, and not more than 37 parts per cent. water.

"Partially skimmed milk cheese shall contain not less than 20 parts per cent. butter-fat in its water free substance, and not more than 45 parts per cent. water.

"Processed cheese shall contain not less than 45 parts butter-fat in its water substance, and not more than 40 parts per cent. water.

"Soft cheese shall contain not less than 50 parts per cent. butter-fat in its water free substance, and not more than 45 parts per cent. water.

"Skim milk cheese containing under 20 parts per cent. butter-fat in its water free substance, and not more than 45 per cent. water."

The committee added that in the case of cheese the description should be set forth on the cheese itself, and on the packages or containers in clear and legible characters, words indicating the type of cheese.

The conference agreed to those recommendations.

The committee affirmed the desirableness of uniform certification of butter and cheese makers, and recommended that the State dairy experts should meet at an early date to formulate detailed proposals on uniform lines in that connection.

The recommendation was adopted.

Conference also endorsed a recommendation that a warning should be issued to all dairymen, against the use of preservatives in milk and cream, in view of the fact that from 1st July, 1927, no butter might be manufactured for export containing traces of preservatives.

Further to the items contained on the agenda, the committee recommended and conference agreed that the use of the word ''butter'' should be prohibited in connection with food products made from products other than butter-fat.

Improvement of Horticulture.

The following recommendations, which were contained in a report furnished by the committee of fruit experts, were approved:—

That as no action has been taken to obtain a report on the general trend of prices and conditions of fruit arriving on oversea markets, the matter should be again put before the Commonwealth authorities for favourable consideration.

That as, in each of the States interested, extensive experiments and research have been carried out in the life history of the codlin moth and its suppression, with encouraging results, the committee strongly recommended that progress reports should be printed by each State, and circulated among other States, and that the work should be continued during the next year, on somewhat similar lines.

Tobacco Growing—Investigations to be Made.

The Chairman also welcomed Messrs. H. W. Gepp (Chairman) and J. Gunn, of the Development and Migration Commission, to the conference, which then went into committee to hear addresses on tobacco-growing and proposed legislation on dried fruits by these gentlemen.

Mr. Gepp outlined important proposals for the advancement of the tobacco-growing industry in Australia.

The announcement created a good deal of interest, especially in view of the letter that had been recently forwarded by the Commonwealth Government to the various State Governments on the subject.

After referring to the letter, Mr. Gepp said he was now in a position to say that £90,000 was available for this work, while the British-Australian Tobacco Company was prepared to find more money, if necessary, to complete the work. (Applause.) For every million sterling of imported tobacco, £4 per week represented 5,000 breadwinners, or 20,000 people, and so the amount paid for imported tobacco would enable 60,000 people to be kept up by the industry if the money were kept in Australia. The consumption of tobacco increased as the population increased, and it was important that they should find a solution of their troubles. The evidence that Australian tobacco at present was not of such a good quality was conclusive. New South Wales was doing good work in an attempt to overcome some difficulties, especially in the matter of blue mould. There was, however, a great deal more to be done towards ascertaining the climatic conditions most suitable for the grower. In the first three years £30,000 would be spent, of which £20,000 had been made available by the tobacco company and £10,000 by the Commonwealth Government, while the States would be asked to provide only £1,000 during that period. It was certain also that if more money was required from the Commonwealth it would be forthcoming. Of the first £10,000, the Development and Migration Commission would supply £5,000, and a similar amount would be forthcoming from the Council of Scientific and Industrial Research.

Exhaustive Inquiries to be Made.

The organisation suggested, said Mr. Gepp, was an executive consisting of one representative each from the Development and Migration Commission (for which he had been nominated) and the Council of Scientific and Industrial Research, and a third man to be selected by those two bodies. The third man could be paid, if thought fit, in order that he might devote more of his time to the work of the committee. It was also suggested that directors of Government departments, or the nominees of Ministers of Agriculture, from the subscribing States should be formed into an advisory consultative committee. It was suggested that the work should be carried out both in regard to the whole of the economic, financial, and business side, as well as the scientific side. A careful selection of the experiences of growers in the respective States would be collected and tabulated, and from them to ascertain certain lines of thought most likely to lead to results. There would also be a careful investigation of complaints of growers in regard to the purchase of their products by the tobacco company. It was only natural that under the conditions of the industry some growers would be disgruntled. The committee would inquire with expedition into such complaints, and would refer any necessary matters to the company.

Experimental Plots to be Established.

On the scientific side they had all matters appertaining to soil, climate, diseases generally, and curing. Details of the organisation would be discussed first by the executive with the consultative committee, and then it would be decided whether they would advertise elsewhere for the best expert. While that organisation was being arranged much work could be done in the collection and tabulation of data from the fields. Some of this work was now being done by the States, particularly in New South Wales, but it would have to be extended as advised by the experts. Types of tobacco would be brought from America in various stages of growth to enable comparison to be made with Australian plants, and it might be possible to grow Turkish and Egyptian varieties in addition to the Virginian types. The first consideration was to ascertain if they could replace the Virginian product. The results of the investigations would be extended to the States, all of which would have experimental plots established, not necessarily in the first year, but after some of the fundamentals had been established. Experiments would necessarily last over several years. Tobacco was grown in America in coarse soils, and where the humidity was high. So far the investigations into the control of blue mould were encouraging. He appealed to all the Ministers to approve of the idea so that they would feel that they had the backing and assistance of all the States in the matter. (Applause.)

Company will give Preference.

In answer to Mr. H. Millington, Honorary Minister in Western Australia, Mr. Gepp said he had the absolute assurance of the British-Australian Tobacco Company that they would purchase up to the limit of production and their demands the Australian product in preference to imported tobacco.

Mr. E. Graham, Under Secretary of Agriculture, Queensland, referred to the remarks of Mr. Millington, who had said that Queensland had been previously "frozen" out in the matter of tobacco-growing. He said that at the time referred to they were growing tobacco in Queensland with a certain degree of success, but, owing to the cost of production having increased much more quickly than in other parts of the world, they found it unprofitable to continue. If they had encouragement they would be able to grow tobacco at a more reasonable price, with the result that they could look forward to better methods being adopted by the growers, with better marketing facilities.

The Hon. J. Cowan, Minister of Agriculture, South Australia, said he hoped the States would co-operate with a view to promoting the industry. The offer made by the Commonwealth Government and the tobacco company was most generous, and he thought they would be lacking in their duty if they did not take advantage of it. (Applause.)

Fruit and Dairy Problems—Raising Dairying Standards.

Wednesday's session was mainly devoted to hearing addresses by Messrs. Gepp and Gunn, of the Commonwealth Migration Commission, and to the consideration of horticultural matters. Agreement was reached on many points.

Mr. Cowan welcomed Mr. W. Slater (Minister of Agriculture from Victoria), who had not been able to attend the conference before.

Mr. Slater returned thanks for his welcome. He was only a youthful Minister as far as Ministers were concerned. He had only been in office a week. The deliberations of the conference would be awaited with interest in Victoria, which State was vitally concerned in most of the matters under discussion.

Control of Stock Diseases.

Mr. W. F. Dunn (Minister for Agriculture in New South Wales) drew the attention of the chairman of the Development and Migration Commission (Mr. H. W. Gepp) to a resolution adopted by the conference on the previous day, in which the shipping companies agreed to transport stud stock free to Australia on the condition that the British, Commonwealth, and State Governments paid for the other expenses, such as rail transport, fodder requirements, and quarantine expenses. He asked that the Commission should favourably recommend the proposal to the Commonwealth Government.

Mr. Gepp said he would be only too pleased to do what Mr. Dunn had suggested. While he was in London with the Prime Minister, they were approached with regard to helping the British producers of stud stock to overcome the difficulty of the embargo on foot-and-mouth disease. It would be disastrous if it was introduced into Australia. (Hear, hear.) The embargo had been lifted as far as Scotland was concerned, but it was still in operation in regard to England, but he would not like to take the responsibility of having it lifted from the latter country, as it was a matter for the experts to advise on. It was interesting to know that the Empire Marketing Board had offered financial assistance in this matter, and it was only necessary for the Australian Governments to confirm the arrangement to put it into operation.

Investigations in New Zealand.

Investigation was being made, added Mr. Gepp, into the conservation of fodder, and the results of certain experiments would be communicated to the States later. They should endeavour to raise the general average of the whole of the dairy industry of Australia. If they could get the Ministers of Agriculture to agree, it might be worth while sending one, two, or even three men to New Zealand to make a detailed report on the latest methods of dairying operating in that country. He would be glad if conference would consider if the action would be justified, as he was sure that if a recommendation to that effect was sent to the Federal Government the delegation would be sent. (Applause.)

Fruit Problems.

The committee consisting of the fruit experts from the various States reported that, owing to the varied facilities available for pre-cooling cargoes of apples prior to shipment at the shipping ports in the various States, and the absence of definite data founded on actual experiments, carried out with large cargoes carried between Australia and Europe, it was considered inadvisable to enact regulations and forcing pre-cooling. The committee, however, emphasised the desirability of tests being made upon commercial shipments. Holds capable of containing 10,000 to 30,000 cases each should be completely filled with pre-cooled fruit, as compared with a similar quantity of apples, which had been loaded in such a manner as to afford sufficient ventilation on the same boat.

Dr. S. S. Cameron (Director of Agriculture, Victoria) moved:—"That this conference considers it desirable that a system of pre-cooling of fruit prior to shipment be encouraged in all States where facilities exist." He did not think there should be such large experimental shipments, as suggested by the committee, because they might not be successful. They had no facilities in Victoria to carry out a scheme, but if exporters could get sufficient encouragement from this conference, it was quite possible that some small shipments of from 3,000 to 5,000 cases would be shipped next season. This, he contended, would provide more effective experiments than the one recommended by the committee.

The motion was carried.

The committee recommended the placing of distance reading electrically controlled thermometers at the principal points of critical importance in the holds of ships carrying fruit to Europe, and suggested that the conference should request the Federal Government to install them in the Commonwealth steamers.

The committee expressed the opinion that the question of uniform grade maturity standards throughout the States did not warrant all the States taking legislative action.

As experience had shown that unwrapped William pears kept better in cold storage, the committee suggested that the Commonwealth Government should be asked to allow those pears to be exported in an unwrapped condition.

In view of the Federal Government having presented grade standards for citrus fruits for export, it was recommended that the States should adopt similar grade standards for interstate trade, with provision for local requirements.

Effective methods of control of the root-borer had been discussed by the fruit officers of the various States, and it was agreed that investigations into the question should be undertaken in the States where such pests were prevalent.

The committee considered that it was desirable that the matter of a uniform system of variety branding abbreviations should be taken up between the States, which had considerable trade in fruit with each other.

The committee supported the request that the Council of Science and Industrial Research should be requested to investigate the different fuels at present in use, or other possible sources of supply, with a view to providing a cheap and economical fuel for use in orchard heaters, which were used as a safeguard against frost injury.

The recommendations were adopted.

Increasing Home Consumption.

Mr. L. T. MacInnes (Dairy Expert in New South Wales) dealt with the question of the expansion of the home market and the limitation of imports covering milk, butter, and cheese. Australians, he said, now consumed 81,000 tons of butter a year out of a total production of 110,000 tons; so it would be seen that there was little left for export. In the official year-book of Australia, the consumption per head was 28½ lb. a year, but in New South Wales the actual consumption was nearer 36 lb. On those figures the other States consumed about 26 lb., but if they consumed the same as New South Wales, about 10,000 tons a year would be added to the total of 83,000 tons. The consumption of cheese here was the lowest in the world, being about 3 lb. a year for each individual. The consumption of milk per head was only a quarter of a pint per day, and it should be at least a pint. With a little organisation and propaganda the consumption of all these items could be greatly increased, and with the aid of a higher importation duty on these articles, a lasting benefit to the dairy farmers would be obtained. They would secure a local price more in conformity with the cost of production, and would thus be independent of overseas markets.

The Chairman remarked that in South Australia they had dairy produce departments, in addition to the Farmers' Union, and a company by the name of "Amscol," and the work of these concerns was quite up to date.

Mr. Dunn moved:—"That conference is of the opinion that steps and propaganda should be undertaken with the object of increasing the home consumption of dairy products, and also that the policy of marketing only the best grade produce should obtain."

The motion was carried.

Grade Standards.

Mr. E. Graham (Under Secretary for Agriculture in Queensland) moved:—"That conference reaffirms the desirability of fixing uniform grade standards for every kind of tropical fruit in all States."

Mr. F. E. Ward (Director of Agriculture in Tasmania) moved:—"That, in order to place the operation of the existing grade standards for fresh fruit on a more effectual and economic basis, each State maintain supervision over consignments exported to the other States of the Commonwealth to ensure that they comply with the requirements." He said Tasmania wanted all the States to adopt inspection before export.

Mr. H. Millington (Hon. Minister in Western Australia) said it would mean an increase in the inspectorial staff. That was a big matter in his State.

Mr. Slater said they had regulations in his State which met the position.

Other delegates said their States were meeting Queensland in the matter of the banana standard.

Mr. Ward withdrew his resolution, and the motion moved by Queensland was carried.

Rights of Propagators.

Mr. Ward moved:—"That consideration be given to the introduction of legislation which will protect the rights of propagators in the sale of new and improved fruit varieties."

Mr. Slater opposed the resolution, while Mr. Millington said such legislation would be contentious, and would be subject to much litigation. Even if they were favourably disposed to it, was it practicable?

Mr. Dunn supported those views, and the motion was withdrawn.

Quarantine Station for Plants.

Resolutions dealing with the establishment of quarantine stations for plants were submitted by Tasmania and Queensland, reading respectively:—"That the Commonwealth Government be requested to establish a central quarantine station for the introduction of new and improved fruits from countries upon which an embargo exists in respect to bacterial disease or fungus and insect pests"; and "Equipment of a quarantine station for plants in each State."

On behalf of Tasmania, Mr. Ward said America had adopted the principle with success, but in Australia they were now debarred from importing because of the danger of pests and diseases.

Mr. E. Graham (Queensland) said the Commonwealth Quarantine Act provisions covering the importation of plants were stringent indeed. It was difficult to comply with them in their entirety. Some of the States had the matter under consideration, especially the setting up of stations to prevent the introduction of diseases. In Queensland they could not avail themselves of the State provisions and facilities, as they were mainly concerned with tropical plants, although they were asking for the assistance of conference.

Mr. Millington moved an amendment reading:—"That the Commonwealth Government be requested to establish a quarantine station for plants in each State in co-operation with the State Agricultural Departments."

Mr. Slater seconded. It was necessary, he said, that the rigorous regulations should be enforced.

The amendment was carried.

Security Against Crop Losses.

Mr. Ward moved:—"That, in order to afford fruit-growing settlers security against severe crop losses from hailstorms, the Development and Migration Commission be requested to investigate the possibilities of inaugurating a system of insurance that will be applicable to the principal fruit industries." He said that, owing to the failure of crops in certain parts of Tasmania, the motion had been introduced. The system had been adopted in America, and, therefore, it should be practicable in Australia.

Mr. Dunn said several of the insurance companies now operating in Australia had adopted the risk, but the premiums were so high that unless the practice became general, the rate would continue to be prohibitive. If it were placed on a co-operative basis the rates would be reduced.

Other speakers were in favour of the motion, which was carried.

Duty on Bananas.

Mr. Millington brought up the matter of the duty on bananas imported into Western Australia from Java and the adjacent islands, and he moved that the Commonwealth Government be asked to remove the duty of 1d. per lb. as applied to Western Australia alone. The regulations, he said, inflicted hardship in his State, particularly in the north-western portions. The tariff, as far as those portions of the State were concerned, was purely a revenue tariff, because Queensland bananas were not being imported.

Mr. Dunn thought the Commonwealth should be asked to make the rebate, because the tariff merely protected the eastern States. Western Australia was thoroughly justified in asking for it. The duty of 1d. per lb. meant a tariff of 4d. a dozen.

Mr. Slater opposed the resolution, which he regarded as the thin end of the wedge. It was dangerous, he said.

Mr. Graham suggested that conference leave the matter to be settled between Western Australia and the Commonwealth.

Mr. Millington said he thought an expression of opinion from the conference would be helpful to his State. He moved:—"This conference is of the opinion that the rebate of the duty on bananas imported into Western Australia will not affect detrimentally the banana industry of the other States."

The motion in its amended form was carried.

Rough Handling of Cases.

Mr. Ward moved:—"That each State introduce legislation which will make it a penal offence for any person to handle or treat cased fruit in a manner which will be detrimental to the contents." He said such legislation was operating successfully in Victoria and Tasmania, and under those circumstances he failed to see why it could not be introduced in other States. Fruit cases received rough handling at the hands of railway and shipping, and other authorities.

Mr. Dunn: It will operate against shipping.

Mr. Ward: I do not think so.

The motion was rejected.

Tobacco Proposals.

Mr. W. F. Dunn (Minister of Agriculture, New South Wales) moved that the conference, having heard the proposals of the Commonwealth Government in regard to research into tobacco-growing, recommend to their respective Governments the acceptance of the scheme. It was a wise step to take, he said.

Mr. W. Slater (Minister of Agriculture, Victoria) seconded. The previous Government of Victoria, he remarked, had already accepted the proposals, and he could see no reason why that decision should be varied.

The motion was carried.

Dairying Problems.

The committee of dairying experts submitted a further report, in which they considered that the best system whereby Governments and farmers could obtain the most satisfactory results from herd-testing was that carried out by the Departments of Agriculture of each State with staffs under their direct control. While affirming the general principal for uniform application throughout Australia, it was recognised that it would be necessary to vary its application in accord with the different conditions which pertained within the State.

Regarding cheese standards, the committee recommended that those previously submitted should be forwarded to the administrators of the Pure Food Acts of the various States, and to the Minister for Markets and Migration, with a recommendation that they be adopted, with a view to securing uniformity among all authorities within Australia.

The committee also unanimously recommended the reaffirmation of a resolution passed last year that legislative action should be taken to control the use of sires for the improvement of breeding of grade dairy cattle, and that in giving effect to that resolution, a system of registration on the lines successfully put into operation in South and Western Australia should be adopted.

The recommendations were adopted.

Wheat Standards.

Mr. H. Millington (Honorary Minister, Western Australia) said it was reported that New South Wales had decided to adopt permanent standards for bulk wheat. He therefore moved—"That, in view of the decision of New South Wales to adopt permanent standards for bulk wheat and to submit them to each State, this conference recommends that each wheat-growing State should submit suggested standards for bag wheat, to enable both standards being submitted simultaneously."

Mr. Millington said it would not be long before the other States would have to fall into line with New South Wales and adopt standards for bag wheat, whether they liked it or not. However, that transition could not be rushed. By standardisation they could boost Australian wheat as the best in the world, and it might be an advantage over present f.a.q. standards.

Mr. Dunn (New South Wales) seconded the motion, and said any change as was suggested could only be brought about gradually. New South Wales passed legislation about twelve months ago for the standardising of bulk wheat.

Dr. S. S. Cameron (Director of Agriculture, Victoria) outlined his inquiries into the standardising of the bulk handling of wheat in Canada, and said he would hesitate in adopting the policy in Australia.

Mr. G. L. Sutton (Director of Agriculture, Western Australia) said Australian agricultural machinery had developed to such an extent that it made possible the cultivation of land previously thought valueless. Notwithstanding this, the standard of wheat was deteriorating, owing to the rubbish and unmillable materials contained in it. They were trying to improve their dairy produce, fruit, and so on, and there was no reason why they should not try and do the same in regard to wheat, which was one of the things of which they were proud.

Dr. Cameron objected to the statement concerning the deterioration of Australian wheat.

Mr. Millington: It is not the grain that is deteriorating.

Dr. Cameron said Australian wheat was the best in the world. A short time ago it was cabled to the papers that at an international show in the United States of America a sample of wheat had been pronounced the world's best because it went 65 lb. to the bushel. At the Shepparton Show in this State wheat was shown that went 71 lb. to the bushel.

The motion was carried.

It was decided to hold the next conference in Perth.

SNAKE SKINS FOR PROFIT.

Thus a Press message from Coolangatta:—

The remarks made by Mr. T. C. Beirne on his return from Europe regarding the popularity of snake-skin goods in Paris, and the possibility of developing a profitable trade between Australia and the Continent in this commodity was brought under the notice of Mr. G. T. Williams by a representative of the "Telegraph" (Brisbane). Mr. Williams, who is an experienced bushman from Victoria, is making his way to North Queensland with a view of selecting a suitable centre in which to secure skins suitable for marketing. During the past three years Mr. Williams has been engaged in what may be termed the "snake industry" in Victoria and parts of New South Wales, and during that period has captured a very large number of reptiles which he has had no difficulty in disposing of at good profit. Numbers of the reptiles were captured alive and sold to showmen and agents for zoological gardens, whilst several hundreds of skins have been tanned for commercial purposes. The variety most suitable for commercial use, according to Mr. Williams, is the carpet snake or rock python, which is found in large numbers in Queensland, and which lends itself to the tanning process more readily than any other variety.

Asked for a few hints to assist the amateur in preparing the skins for market, Mr. Williams said that the head of the reptile should first be removed, then, beginning at the neck, the skin should be turned back with the aid of a knife a sufficient distance to grip it with the fingers. By holding the neck down the skin then can be stripped off intact. Whilst the skin is inside out any adhering flesh or fat can be readily scraped off. The skin can be reversed by turning it on a piece of wire or a thin stick, beginning at the tail. To effectively cure the skin it is necessary first to deal with the thin outer skin which is shed by the reptile periodically. The best wash consists of 1 lb. of fresh lime in 4 gallons of water, which, after being left standing for two hours, is stirred up and the skin placed therein. The wash is then allowed to settle, but the skin is removed, and the mixture stirred two or three times daily. At the end of forty-eight hours the scales may be removed with a blunt knife or a piece of hoop iron. The removal of the outer skin in most cases improves the pattern and adds to its permanency, and increases the market value of the skin.

The next process is the treatment of the fleshy side of the skin with a solution consisting of equal parts of methylated spirits, glycerine, and water, which must be repeated after the skin has been rolled and allowed to remain overnight to dry. The softening process is effected with very fine sandpaper or pumice-stone by rubbing the inner side of the skin gently from the neck to tail. This portion of the treatment requires the greatest amount of care on account of the thinness of the skin.

QUEENSLAND TREES.

THE TALLOW-WOOD (*Eucalyptus microcorys*).

By C. T. WHITE, Government Botanist.

The Eucalypts of Australia number about 250 species, of which, perhaps, about seventy occur in Queensland, many of these, of course, being common to Queensland and the neighbouring States.

The Eucalypts in themselves form a very natural group, but present many difficulties at any attempt to arrange the species into natural groups, each possessing a number of characteristics in common. The bushman's classification by barks is perhaps, as good as any. By this system the eucalypts fall into about five more or less natural groups—(1) The smooth barked trees or Gums proper, (2) the Boxes, (3) the Stringybarks, (4) the Ironbarks, and (5) the Bloodwoods.

The Tallow-wood does not fall naturally into any of the above, though placed among the Stringybarks. It differs from these, however, in the bark fibres being short and the outer ones inclined to be flaky.

The Tallow-wood ranges through New South Wales to Southern Queensland, attaining its best development under good rainfall and soil conditions. The wood is rather greasy, hence the local name. It is one of the best of the hardwoods, being very durable under exposure to the weather. It is greatly favoured for veranda posts and flooring. The Chief Engineer's Department of the Queensland Railways gives the average life of Tallow-wood sleepers at seventeen and a-half years.

The botanical name is *Eucalyptus microcorys* and refers to the similarity of the little cup fitting over the flower being the shape of a Greek fighting helmet.

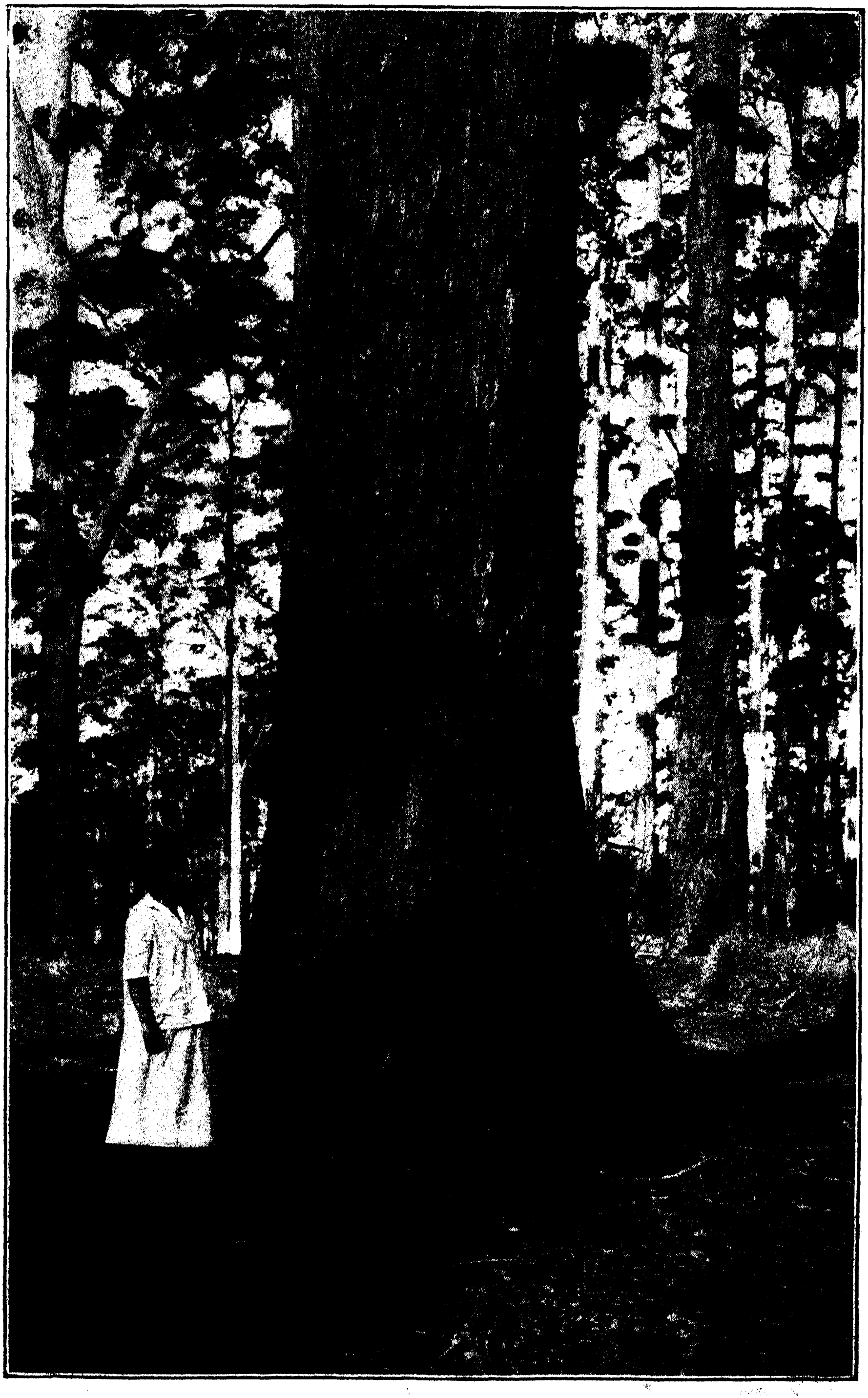


Photo.: C. T. White.]

PLATE 8.—A FINE TALLOW-WOOD ON TAMBOURINE MOUNTAIN.

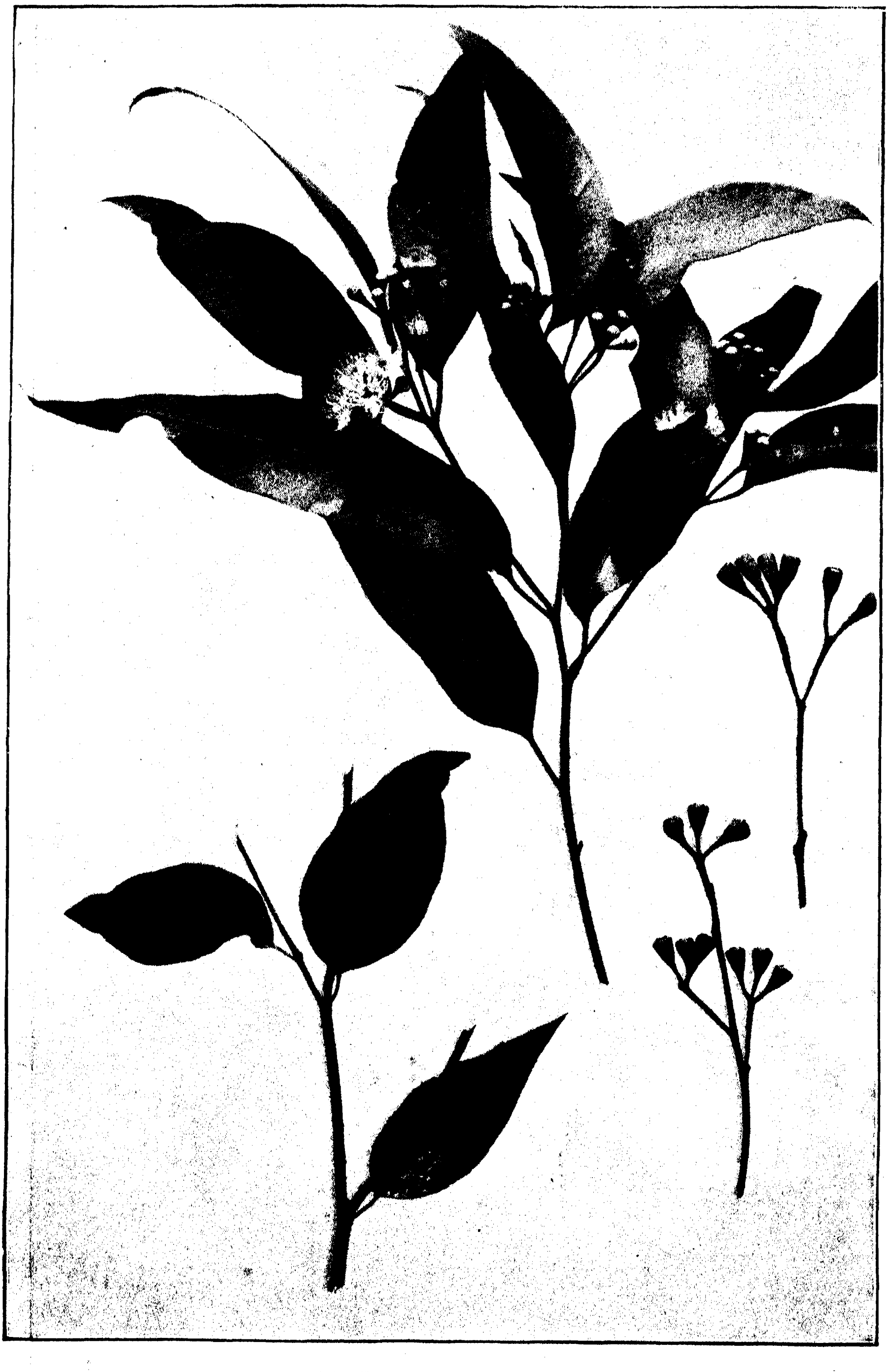


Photo.: Department of Agriculture and Stock.]

PLATE 9.—LEAVES, FLOWERS, AND SEED-CAPSULES OF THE TALLOW-WOOD.

FAT LAMB RAISING.

The subjoined note issued by the New South Wales Department of Agriculture will interest Queensland small flock masters and other small holders. Differences in local conditions will, of course, be duly regarded.

Pastoralists—those who raise fat lambs in particular—have begun to realise that it pays to devote a good deal of attention to the improvement of their pastures, both by the sowing of recommended grasses and by top-dressing the natural pastures with superphosphate. Light dressings of superphosphate—¾ cwt. per acre—have been found to be sufficient for the drier parts of the State, and its application results in the quality and quantity of the natural pasture being increased. Moreover, stock of all kinds prefer the top-dressed pasture because they have a higher percentage of mineral ingredients, and are more attractive and palatable to the animals.

Good feed and plenty of it is necessary at all times during the growth of the lamb. What the market requires is a plump, well-shaped, sappy lamb, weighing between 30 and 40 lb. The lamb can be heavier if it is not dry and old. Lighter lambs will also sell well if fat and plump. The main point is that the fat lamb must have plenty of bloom, and this can only be assured by giving them the best possible conditions right up to the time they are trucked.

Shortage of Feed Checks Early Growth.

Any check due to a shortage of feed means a decrease in the milk supply from the mother, besides a smaller amount of feed collected by the lamb itself from the pastures, and the lamb will never properly recover. The lamb must be grown during that season of the year when the best feed is available, and should be marketed before or as soon as the pastures begin to dry off. The drying off of the pastures will mean a drying of the lambs, and they will lose that sappy nature and bloom which is so desired. Over the bulk of the State where this class of sheep-raising is carried out, an autumn lambing will be found the best.

In the cold districts of the State, where lambing takes place in the spring, the lambs will be growing during the summer, and suitable summer crops should be selected and grown, which, in conjunction with the natural pasture and stubble, will insure plenty of feed to force the growth of the lambs. In these cold districts fodder crops or extra feed will have to be supplied to produce a satisfactory export lamb, as, besides the fact that the natural pasture in these districts is not of the best, the climatic conditions tend towards slow maturity and a small-framed animal.

In average seasons in the western and south-western districts there is usually sufficient rain in the autumn to insure a certain amount of growth in the pastures, but for the raising of fat lambs this feed should be supplemented by green fodder crops. In this way every opportunity is given the lamb to get a fair start. The crop should be ready for the ewes to be put into it just prior to lambing. This will increase the milk supply, and if alternated with natural pastures there should be abundant feed until the usual spring growth, when the fodder crop can often be allowed to grow up for hay or silage.

Crops to Grow.

In deciding what crop to grow for fodder the general farm practice should be considered. It should be made to work as part of a rotation of crops on the farm. Of those available, the most satisfactory is oats, which, besides providing a good bulk of feed, helps to counteract such wheat diseases as ''take-all,'' &c. Skinless barley is also recommended, and provides particularly good feed. Rape, or a mixture of rape and barley, will give a great bulk of feed if the season it suitable for a good germination of the rape. Rape alone should be fed off with care or losses may occur from ''hoven.''

Grasses to Sow.

On the Western Slopes and in the Riverina, Wimmera Rye grass and lucerne have proved very successful, and the following mixture is recommended:—Lucerne, 3 llb., and Wimmera Rye grass, 3 lb. per acre. On soils too shallow for lucerne, sow Subterranean clover 2 lb. and Wimmera Rye 3 lb. per acre.

In parts of the North-Western and Central-Western Plains, lucerne 3 lb., and Wimmera Rye grass 3 lb. per acre is giving good results, especially on old cultivation paddocks. Where lucerne will not thrive sow from 4 to 5 lb. Wimmera Rye grass per acre. Certain native grasses, like Coolah (*Panicum prolutum*), Giant Panic (*Panicum antidotale*), Warrego Summer (*Panicum flavidum*), Native Millet (*Panicum decompositum*), Diffused Panic (*Panicum effusum*), and Wallaby or White Top (*Danthonia semiannularis*), have also proved promising under cultivation.

PLATE 10.—INTERSTATE DELEGATES TO PIG INDUSTRY CONFERENCE, SYDNEY, NEW SOUTH WALES, 7TH AND 8TH JUNE, 1927.

(For Reference, see page 51.)

PIG RAISING IN AUSTRALIA.

A COMMONWEALTH CONFERENCE.

At the instance of the Minister for Markets and Migration (Hon. T. Paterson, M.P.), a conference of representatives of the pig industry in Australia was held at the Commonwealth Offices, Commonwealth Bank, Sydney, on Tuesday and Wednesday, 7th and 8th June, 1927. The following representatives were present:—

The Commonwealth Departments represented by the Hon. the Minister for Markets and Migration (Mr. T. Paterson); the Secretary (Mr. E. J. Mulvaney, I.S.O.); Mr. L. E. Stevens and the Conference Reporter (of the same Department); Mr. P. J. Carroll, Chief Supervisor of Dairy Exports, Victoria; and Mr. J. M. Davidson, Commonwealth Veterinary Inspector stationed in New South Wales.

The State Departments of Agriculture represented by Mr. R. T. Archer, Senior Dairy Instructor, Victoria; Mr. L. T. MacInnes, State Dairy Expert, and Mr. J. A. Robertson, M.R.C.V.S., Herdmaster, Department of Agriculture, New South Wales; E. J. Shelton, H.D.A., Instructor in Pig-raising, Department of Agriculture and Stock, Queensland.

The producers represented by Mr. G. A. Bedwell, Victoria; Mr. J. A. L. Thompson, New South Wales; Mr. J. A. Heading, chairman of directors of the Queensland Co-operative Bacon Association (Murarrie), Queensland.

The Proprietary Bacon Factories represented by Mr. Allen (J. C. Huttons Proprietary, Limited), Victoria; Mr. W. J. Gale (Barnes Bacon Co.), New South Wales; Mr. T. L. Jones (Foggitt, Jones, Ltd.), and Mr. E. E. Forth (J. C. Hutton Pty. Ltd.), Queensland.

The Co-operative Bacon Factories represented by Mr. A. J. Cooke (Farmers' Co-operative Union Ltd.), S.A.; Mr. T. J. McGalliard (Gippsland Co-operative Bacon Co., Ltd.), Victoria; Mr. W. H. Clifford (Co-operative Bacon Factories Federation Ltd.), N.S.W.; Mr. H. M. Hart, chairman of directors (Darling Downs Co-operative Bacon Co., Ltd.), Queensland. Mr. O. C. Krimmer, of the same company, was present at the conference as a visitor.

The Australian Stud Pig Breeders Society was represented by the President, Mr. A. C. Stewart, of Victoria.

In opening the conference the Minister for Markets (Mr. Paterson) said that at the Animal Husbandry Conference, held in Sydney last September, a resolution was carried, partly as a result of which this conference had been called. The

---

DESCRIPTION OF PLATE No. 10.

Reading from Left to Right—

Front Row—Mr. L. T. MacInnes, State Dairy Expert, New South Wales; Mr. J. A. Robertson, Herdmaster, Department of Agriculture, New South Wales; Mr. J. M. Davidson, Commonwealth Veterinary Officer, Sydney, New South Wales; Mr. E. J. Mulvaney, I.S.O., Secretary, Department of Markets and Migration, Victoria; Hon. T. Paterson, M.P., Minister for Markets and Migration; Mr. E. J. Shelton, Instructor in Pig Raising, Department of Agriculture and Stock, Queensland; Mr. E. E. Forth, General Manager, J. C. Hutton's Proprietary, Limited, Brisbane; Mr. T. L. Jones, General Manager, Foggitt Jones, Limited Brisbane.

Back Row (*Standing*)—Mr. A. J. Cooke, representing Co-operative Bacon Factories of South Australia; Mr. M. Allen, representing Proprietary Bacon Factories of Victoria; ———, Conference Reporter; Mr. O. C. Krimmer, Darling Downs Co-operative Bacon Company, Queensland; Mr. H. M. Hart, representing Co-operative Bacon Factories of Queensland, also Chairman of Directors of Darling Downs Co-operative Bacon Company; Mr. J. A. Heading, Chairman of Directors of Queensland Co-operative Association, Murarrie, representing Producers of Queensland; Mr. P. J. Carroll, Commonwealth Dairy Branch, Victoria; Mr. L. E. Stevens, Department of Markets and Migration, Victoria; Mr. W. J. Gale, Barnes Bacon Company, Sydney, representing Proprietary Bacon Factories of New South Wales; Mr. J. A. L. Thompson, South Gundagai, New South Wales, representing Producers of New South Wales; Mr. T. J. McGilliard, representing Co-operative Bacon Factories of Victoria; Mr. W. H. Clifford, of Norco, Limited, New South Wales, representing Co-operative Bacon Factories of New South Wales; Mr. G. A. Bedwell, representing Producers of Victoria; Mr. R. T. Archer, Senior Dairy Instructor, Department of Agriculture, Victoria; Mr. A. C. Stewart, President Australian Stud Pig Breeders Society.

resolution was as follows:—"That in view of the unsatisfactory conditions which exist in Australia in the pig industry as regards breeding, feeding, management, and fodder organisation, and in order to assist in promoting an export trade in bacon, this conference urges the Federal Government to convene a conference representative of the pig industry to formulate plans for the organisation of that industry on economic lines." Since that date he had received a good deal of correspondence from those engaged in the industry who were anxious that such a conference should be called. To-day they had representation of all the interests concerned so far as they could reasonably do so within the limit of numbers. A few figures regarding the industry might be interesting. There were about one and one-eighth million of pigs in Australia, the number in each State approximately being:—New South Wales, 382,331; Victoria, 339,601; Queensland, 199,598; South Australia, 90,794; Western Australia, 74,316; Tasmania, 41,009; Northern Territory, 382; Federal Capital Territory, 343; making a total of 1,128,374. Great Britain imported about £66,000,000 worth of pig products annually. Of that amount about £23,000,000 was received from United States of America, £22,000,000 from Denmark, and of the remainder Canada provided about £8,000,000. Although United States of America sent a little more in total product than Denmark, she did not send nearly so much bacon, but more lard, fats, &c. Australian exports to Great Britain were only about £7,000. In 1925-26 Australia sent away 90,000 lb. of pork, but imported 500,000 lb. in hams and bacon, of which nearly 480,000 came from New Zealand. This present year, taking the ten months up till the end of April, Australia had exported about 450,000 lb. pork, or about five times as much as she did for the twelve preceding months.

"I notice," continued Mr. Paterson, "that Mr. Ross Grant, Commonwealth veterinary officer in London, expresses the view that frozen bacon tends to become rather tallowy in flavour, and he says that it would be much better if we concentrated our attention on frozen pork rather than frozen bacon.

"In opposition to that statement we learn from Messrs. Foley Bros., who sent a consignment of bacon away, that the report upon it was very favourable indeed. This is against the contention that was made that freezing bacon tends to give it a tallowy flavour. The Western and Murray Co-operative Bacon and Meat Packing Co., Ltd., experimented last year with 1,000 carcases of pork to Great Britain. Half of it was sent to London, the other half to Glasgow. It turned out very well indeed, and was favourably commented upon by the trade, which stated that it had never seen finer frozen pork either from New Zealand, North America, South America, or any other country exporting to Great Britain.

"There is another matter which I should like to mention. You probably know of the prohibition which Great Britain has placed upon the importation of bacon containing boric acid. It relates to butter from the beginning of next year, but to bacon from 1st July of this year. It has been said in some quarters that bacon tends to become slimy if it is not treated with boric acid. That again has been advanced as another argument which should assist in the endeavour to send away frozen pork rather than bacon.

"The Commonwealth Government, through the Council for Scientific and Industrial Research," added the Minister, "is very anxious to do what it can to encourage primary and secondary industries, and has made available £250,000 for investigations, in addition to £100,000 for an endowment fund from the interest on which young men will be trained in research work. That council has been asked to look into certain pig diseases, and has initiated certain investigations into paralysis in pigs. This is to be investigated at the Glenfield Animal Research Institute. Dr. Finlay has completed a survey of the animal industry (including pigs) in Tasmania, and his report is now under consideration by the Development and Migration Commission.

"The maize industry some months ago, which is carried on in the same States as the bacon and pork industry, decided to have a voluntary organisation consisting of State committees composed of six State representatives in Queensland, eight in New South Wales, and six in Victoria. From the State committees and from these committees two delegates were appointed to form the Australian Maizegrowers' Council. I think some organisation, loosely knit in character, which would embrace both producers and curers of the four States concerned, would be of benefit to the industry."

Federal Organisation Approved.

At the conclusion of his speech Mr. Paterson asked members of the conference to express their views as to the desirability of some form of organisation for the industry.

After exhaustive discussion, a motion was unanimously carried to the effect that a Federal organisation, comprising representatives of producers, proprietary, and co-operative bacon factories, and Government experts be formed with a committee in each of the States.

Consideration was then given to composition of the Federal and State committees.

After discussion, in which each of the representatives expressed their personal views, and, where possible, the views of the organisation they represented, the following scheme of organisation in connection with the industry was agreed to:—

(1) The organisation shall consist of the Council for the Australian Pig Industry with a committee in each State.

(2) The functions of the Council shall be (*a*) the organisation of the industry on economic lines; (*b*) the raising of the standard of production; (*c*) the promotion of the Australian and oversea trades; and (*d*) the development of the industry generally.

(3) The council shall consist of the following representatives:—(*a*) One from the producers in each State; (*b*) one from the co-operative bacon factories in each State; (*c*) one from the proprietary bacon factories in each State; (*d*) one from the Federal Council of the Australian Stud Pig Breeders' Society; (*e*) one from the Department of Agriculture from each State; and (*f*) two from the Commonwealth.

(4) The committee in each State shall consist of the following representatives, with power to add proportionately to the numbers:—(*a*) Two from producers, except in New South Wales, where there shall be three; (*b*) two from co-operative bacon factories; (*c*) two from proprietary bacon factories; (*d*) one from the Department of Agriculture; and (*e*) one from the Commonwealth.

(5) The members of the council shall be elected by and from the State committees, substitute or proxy to be allowed to act for any member unable to attend any meeting of the council, on appointment signed by such member, or failing him, by the secretary of his State committee.

(6) The producers' representatives on the State committees shall be elected as follows:—New South Wales: One by the New South Wales branch of the Australian Stud Pig Breeders' Society, one by the Farmers and Settlers' Association, and one by the Primary Producers' Union of New South Wales. Victoria: One by the Victorian branch of the Australian Stud Pig Breeders' Society, and one by the Chamber of Agriculture. Queensland: One by the Queensland branch of the Australian Stud Pig Breeders' Society, one by the Local Producers' Associations. South Australia: One by the local branch of the Australian Stud Pig Breeders' Society, and one by the Dairymen's Protection Association. Western Australia and Tasmania: One in each State by the State branch of the Australian Stud Pig Breeders' Society. One in each State by the appropriate association or interest in each State, such association or interest to be determined in the event of Western Australia and Tasmania deciding to join the council.

(7) The representatives of the co-operative and proprietary bacon factories shall be elected by the co-operative and proprietary factory organisations respectively, in each State.

(8) The State and Commonwealth experts shall be appointed by the State and Commonwealth authorities respectively.

(9) The expenses of the members of the council and of the State committees shall be paid by the respective organisations they represent.

(10) Until otherwise arranged, the secretarial and administrative work of the council shall be carried out by the Federal Department of Markets.

The scheme will be submitted by the Department of Markets and Migration to the interests concerned in the several States of the Commonwealth, and, if approved, they will be asked to form State committees and elect representatives to the Federal council.

The conference also discussed many matters of importance to the pig industry, including marketing, grades and standards, production, breeding, feeding, interstate carriage of pork and bacon, rail transport conditions, inspection and diseases of pigs. It was decided that these matters should be referred for closer investigation to the proposed council, when appointed.

Mr. Paterson expressed his gratification at the cordial spirit of co-operation between the representatives of the different branches of the industry which marked the proceedings of the conference, regarding it as a happy augury for the future of the proposed organisation.

STATE COMMITTEES.

Matters to be specially considered in the initial stages by the various State committees include—

(1) The organisation of the industry, including both home and overseas marketing.

(2) Grades and standards, especially as they apply to the possible export of frozen pork or bacon in the green (*i.e.*, salted but not smoked form) such bacon to be washed, dried, smoked, and finally prepared for market, overseas. The matter as to whether frozen pork or bacon provides the better market outlet is to be considered.

(3) Production and development of the industry in the several States, with the final linking up, if thought desirable, for export markets.

(4) Breeding, especially in so far as it refers to the correct type of pig for the markets referred to.

(5) Feeding, including the care and management of the pigs from birth to maturity, the various systems of feeding and handling to be investigated with all details of marketing.

(6) Education, especially in regard to methods of eradication of disease and to preventive measures generally, these aiming at an all-round improvement in the health of the pigs.

(7) General, including interstate transport of pork products; inspection fees; condemnation at slaughter and an investigation of the causes responsible for these losses.

A special study of the various breeds and crosses is suggested, this, in view of the fact that Danish and Irish breeders especially have found that large Yorkshire crosses have proved admirably adapted to the British bacon markets. Any other matters that may arise and be considered worthy of discussion at both State committee and Federal council meetings.

It was decided that for the time being the Federal council meetings will be held in Sydney on dates to be arranged after the various State committees have been formed and have elected their representatives to the Federal Council of the pig industry.

THE PIG SECTION AT BRISBANE SHOW.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Special attention is drawn to the revised schedule issued by the Royal National Agricultural Association and to several new classes included for competition at the forthcoming August Exhibition in the section devoted to the various breeds and types of pigs.

Prominent among these new classes is "The Bacon Pig Carcase Competition," details of which are as follow:—

Bacon Pig Carcase Competition.

To take the place of Class 499 (which is cancelled), appearing on page 117 of the prize schedule.

Class 499.—Pen of three pigs of uniform type and conformation suitable for bacon curers. First prize, £10; second, £5; third, £2.

The date of birth and sex of each pig must be stated on the entry form together with particulars of the breed of the sire and dam, the objective being to assist in ascertaining the most suitable and efficient type of bacon pig. It is essential that full particulars of the foods used and methods followed during growth and fattening be supplied with each entry.

The exhibit shall be judged first as live animals for conformation and condition; second, after being killed and dressed, for suitability for the bacon curer. Points according to the maximum set out hereunder shall be allotted at each stage of judging. The prizes shall be awarded to the owners of the exhibits which were allotted the greatest aggregate.

The live pigs shall be judged on Monday, 8th August, at 10 a.m., then full fed in the presence of an official, and must not be fed between that time and removal of the single pig for slaughter. On Monday evening one pig shall be selected from each pen and weighed, and shall be removed to a bacon factory, killed and dressed, then returned to the Show Ground, where it will be exhibited in a refrigerated show case. The remaining pigs (two in each pen) shall remain on exhibition until the conclusion of the Show.

The dressed pig will be taken over by the factory at current rates; others may be disposed of as the exhibitor desires.

SCALE OF POINTS.

	Maximum.
Appearance when alive (conformation and condition)	50
When killed and dressed—	
Firmness of fat and quality of meat	30
Length of back	20
Ham	20
Thickness of streak	15
Lightness of fore-end	5
Fineness of bone	5
Fineness of rind	5
Total	150

During the progress of the competition the following data shall be collated—viz., breed of pigs, date farrowed, sex, live weight immediately before removal from Show Ground, weight when dressed, loss from live to dressed weight, commercial value, foods used and methods followed during growth and fattening.

Entries for this competition close on Monday, 4th July. Entry fee 10s.; members half rates.

Litter Weight Contest

Another important addition to the pig section schedule provides for a "Litter Weight Contest," in which the sow is to be shown along with her litter, the litter not to be under three months nor more than six months' old at date of judging. This contest, running somewhat along the lines of the "Ton Litter Contests" of the United States of America, should be productive of a great deal of interest and should create an additional attraction for all concerned. Class number and details are as follow:—

Class 500a.—Best litter of pigs, judged in accordance with the following conditions:—Prizes, £20: First, £12; second, £6; third, £2.

The sow to be shown with her own litter. The litter to be the total number of pigs reared by the sow at one farrowing. The litter not to be under three months nor more than six months old at date of judging, and must have been inspected and earmarked by an official appointed by the Royal National Association.

Intending exhibitors must notify the secretary as early as possible after the birth of the pigs, so that inspection and earmarking may be arranged.

The objective of the contest is to determine the most efficient producers of fresh pork and bacon, and to determine the best methods of breeding, feeding, and management. Entries must be accompanied by a statement as to the methods employed, and foods used in the production of the pigs, together with a record of the breeding of the animal. This information is required for publication, and should be as complete as possible.

It will not be necessary to have the sow in other than good breeding condition, and for this year's Exhibition it will not be necessary that the sow or young pigs be pure bred, but the sire of the litter must be eligible for or registered in the Australian Stud Pig Herd Book.

The male pigs of the litter must be shown as barrows, and not as boars.

The litters will be judged as follows:—

(1) Suitability for fresh pork or bacon factory purposes.

(2) Early maturity.

(3) For judging purposes the following standard of weights will be used:—(*a*) Three months, 55 lb. average; (*b*) four months, 90 lb. average; (*c*) five months, 130 lb. average; (*d*) six months, 180 lb. average.

Entry fee: 10s. members and non-members.

Entries in this class closed on 15th June. Several litters have been entered, and it is hoped this will introduce several entirely new features and be a good start on a fresh line. The litters entered have already been inspected and reported on, and some really good pigs will be shown.

Model Bacon Pigs.

Another section of interest will be the non-competitive pen of model bacon pigs which be on exhibition daily. A lecturette thereon by the Instructor in Pig Raising will be delivered daily at times to be notified on a notice board at this pen. It is hoped pig raisers will endeavour to be present at one or other of these lecturettes, and that many questons will be asked and answered.

State Schools' Pig Club's Competitions.

For the benefit of State School (including Rural Schools) Pig Club members, a special section has been included in which each pig exhibited must be the property of a *bonâ fide* member of a Pig Club as per details herewith.

State and Rural School teachers and Pig Club members generally may obtain further information in connection with this competition either from Mr. J. Bain, secretary of the Royal National Agricultural Association, Courier Buildings, Queen street, Brisbane; from the Instructor in Pig Raising (Department of Agriculture and Stock, Brisbane); or from the Organiser and Instructor in Agriculture (Mr. F. E. Watt), Department of Public Instruction, Brisbane. Details of the classes are as follows:—

Entries close Monday, 4th July, 1927. Entry fee, 5s. each entry.

Each pig exhibited must be the property of a *bonâ fide* member of a State School Pig Club, organised and controlled by the officials of the Department of Public Instruction, and of the Department of Agriculture and Stock.

The School Pig Clubs are grouped into districts as follows—viz., North Coast, South Coast, Brisbane Valley, Fassifern Valley, Marburg; other districts as arranged.

Each district will be allowed up to two entries in each class. *Entries will not be received from individuals.*

In the stud classes both pigs in each pen must be of the same breed; the breed, date of birth, and pedigree to be stated on entry form. In the baconer and porker classes each pen of pigs may be any breed or cross, but must be uniform in type and conformation.

Pigs entered in Stud Classes 495 and 496 cannot enter nor compete in the Bacon or Porker Classes (497 and 498).

Class 495.—Two pure-bred boars, over four months and under nine months old; eligible for registration in the Herd Book. First prize, £5; second, £3 third, £1.

Class 496.—Two pure-bred sows, over four months and under nine months old; eligible for registration in the Herd Book. First prize, £5; second, £3; third, £1.

Class 497.—Three prime bacon pigs, actual live weight not to exceed 170 lb. on judging day. Breeding to be stated on the entry form. First prize, £5; second, £3; third, £1.

Class 498.—Three prime porker pigs, actual live weight not to exceed 110 lb. on judging day. Age and breeding to be stated in the entry form. First prize, £5; second, £3; third, £1.

Other Classes.

In addition to the above the pig section schedule provides numerous classes and liberal prize money for the various pure breeds of pigs and for baconers and porkers. It is hoped that several silver cups and trophies will be available in additon to prize cards, ribbons, and championships.

The Meat Industry Exhibit, in which a special section is being devoted to pork and bacon pigs, will be the most comprehensive display yet staged by the Association covering the meat industry, and it should prove of untold value in disseminating up-to-date information in regard to Queensland's live stock.

General entries in the pig section are timed to close on Monday, 4th July, 1927.

Model 16 Silky Oak. Sixteen Guineas

Notwithstanding the many improved makes of machines offered for sale there is nothing on the market to-day that can

On Real Merit deprive the

Symphona

of its claim to Supremacy

There is an Unassailable Scientific Reason

Extract from a letter received from a well-known Sydney Musical Enthusiast—

"I had no difficulty in unpacking and setting up the Symphona The moment of starting was rather an exciting one for me as my judgment of tone value was now to be judged, but the first tones re-assured me, as I listened I was satisfied. It is all I thought it to be as I listened in your warehouse, and it got my folk much as it got me."

Symphonas are to be found in a number of New South Wales musical homes. We want you to hear it.

KING & KING

LIMITED

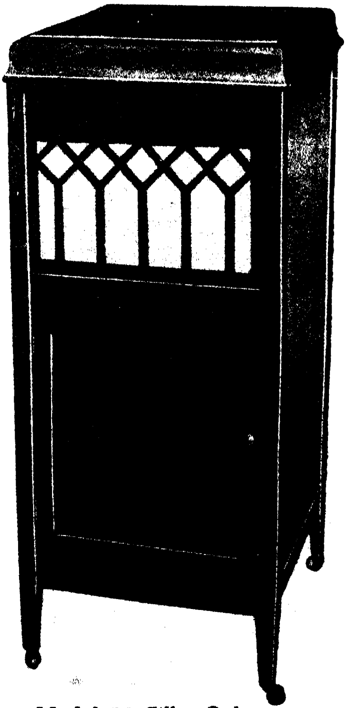
Music Warehouse
Queen St., Brisbane

Patentees and Manufacturers of the

Symphona

TABLE MODELS—
£4 to 12 guineas
CONSOLE MODELS—
16 to 85 guineas
CABINET MODELS—
20 to 63 guineas

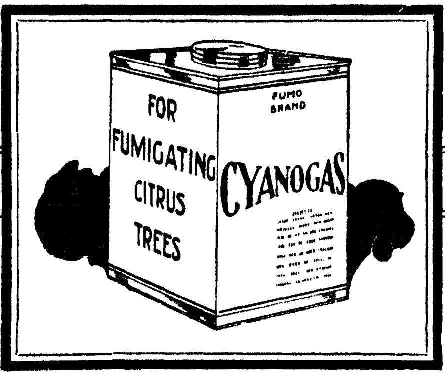
Write for illustrations giving detail, particulars of prices, material and equipment. We CANNOT illustrate the TONE, you MUST hear it for yourself. When in Town, call and ask for a demonstration.



Model 20 Silky Oak
Twenty Guineas

CYANOGAS

(CALCIUM CYANIDE)



It is the Gas that kills them

Cyanogas is a dust which when brought into contact with the air releases hydrocyanic acid gas—the deadliest gas known. It positively KILLS every living insect.

Cyanogas has been proved to be the only effectual remedy for—

BANANA THRIP, all Scale Insects infesting Orange Trees, including PINK WAX, RED, BROWN, MUSCELL, Etc. WHITE LOUSE, GREEN ORANGE BUG and any insect that breathes.

We carry in stock large supplies of—PARADICHLOROBENZENE, ARSENATE OF LEAD, PARIS GREEN, BLACK LEAF 40, "HARBAS" RED OIL, "HAROLA" LIME AND SULPHUR, WEED KILLER, BORDEAUX MIXTURE, BLIGHTY

And the most efficient means of combating Vegetable, Cane, Cotton, and Orchard pests. Also a complete range of SPRAY PUMPS and DUSTERS by the world's most renowned manufacturers.

This department of our business is in the capable hands of an instructor lately associated with the Hawkesbury College, N.S.W.

Consult us on your agricultural problems. Catalogue H.13 free on request.

BUZACOTTS (Q'ld.) LTD.

373A ADELAIDE STREET, BRISBANE.

FALLOWING.

POINTS IN FIELD PRACTICE.

The subjoined note is taken from a recent publication issued by the New South Wales Department of Agriculture. Allowance should be made, of course, for seasonal and other possible differences in local conditions, which might affect the full application of some of the points set out.

That fallowing pays is generally admitted, but not every wheat farmer realises that unless the practice is carried out intelligently much time and labour is expended that could perhaps be more profitably employed in some other farm operation. Not only is time and labour lost, but the crop yield also suffers.

The production of a good fallow is only made possible by ploughing early, and following with a deep primary cultivation in the spring to bring all the clods to the surface, thus aiding consolidation, by judicious working of the fallow when necessary, avoiding the use of disc implements where practicable, and, above all, by maintaining a shallow mulch with a nicely-clodded surface, which will prevent evaporation of moisture and soil erosion.

When to Commence Ploughing.

As one of the main objects of fallowing is to store in the soil the rain that falls before the seed is sown so that it may supplement that which falls during the growth of the plant, the time of ploughing is governed largely by the incidence of the rainfall.

In southern portion of the wheat belt the greater part of the year's rain falls in the winter, and operations must be directed at carrying the rainfall of one winter through the following summer in order that it may be available in the soil in the autumn. Therefore, the land should be ploughed as early as possible, particularly in the drier districts. If possible all the ploughing should be completed by June and July. Experiments and observations have proved that, throughout most of the wheat belt, each month the fallowing is delayed means a reduction in the ultimate wheat yield. There is no doubt whatever that land fallowed in June and July will, other things being equal, give a better yield than that fallowed in August and September.

It is found that 4 to 4½ inches is a suitable depth to plough, and even shallower ploughing is satisfactory. In the drier localities an occasional slight variation in depth is all that is required to prevent the formation of a hard pan.

When to Harrow.

On most soils it is not advisable to harrow the land after this early ploughing. It should be allowed to lie in this rough state so that it can readily absorb moisture, also that weathering agents may act upon it. Practically no rain runs off a ploughed surface; it soaks in and is stored in the subsoil. Being rough and open, the land is also in a suitable condition to derive full benefit from the action of the air, frost, and sun. It is a mistake, therefore, to break down the comb with heavy harrows on most soils.

On some of the heavier and cloddier soils, however, harrowing after ploughing is sometimes advisable. If soils that are always rough and cloddy are harrowed down soon after ploughing, many of the clods will be considerably reduced in size, which is a great advantage, enabling the summer cultivation to be carried out without any inconvenience from overlarge clods. These rough, cloddy soils, if not worked down somewhat during the winter while moist, are very hard to deal with later. The clods become dry and hard in the summer, and none of the ordinary implements are capable of breaking them down to handier sizes.

Cultivating the Fallow.

Harrowing immediately after ploughing is not to be condemned on the self-mulching types of soil (such as black boree country), nor even on the red or brown semi-alluvial soils, small areas of which occur throughout the district. However, on all soils that set after rain and on which it is desirable to maintain a cloddy mulch, excluding the extra cloddy soils mentioned above), it is not advisable to harrow after ploughing, as this practice helps to make the surface too fine without improving the condition of the soil below the surface. When the soil begins to dry up in the spring (end of August or beginning of September), the fallow should be worked with a springtooth cultivator or similar implement so as to prevent evaporation and to prepare the soil for future workings. This first working should be deep. In fact, the cultivator should be set to the full ploughing depth. Fine points should be used so that the clods will be brought to the surface while the finer particles of soil work to the bottom. tI is important that this cultivation be given before the soil begins to lose moisture by evaporation in the spring.

Subsequent working of the Fallow.

From this point nothing definite can be given as to the actual dates on which the different workings of the fallow should be carried out. All subsequent cultivations, however, should be not deeper than 2½ inches so that the sub-surface soils may become consolidated. The grower will have to rely upon his own judgment in deciding when and how to cultivate from this point on till sowing time.

It is not advisable to work a fallow when it becomes too dry, as little benefit, if any, will result. The most suitable time for cultivation is as soon after rain as possible. It can definitely be stated that, other things being equal, a fallow receiving a sufficient number of cultivations will produce a heavier yield than one which did not receive so many. Cultivating the soil definitely increases fertility and makes possible the production of heavier yields, and, although it is not necessary to cultivate after every fall of rain occurring during the summer, it is advisable to work the land after every fall sufficiently heavy to form a surface crust. For this operation the harrows, springtooth cultivator, or rigid tine scarifier may be chosen according to the condition of the fallow, the type of soil, and the presence or absence of weeds. If the soil is medium to heavy loam and is free from weeds the harrow or springtooth cultivator would serve. If semi-alluvial brown loam, light red loam, or heavy black self-mulching soil, and free from weeds, the harrows would be the most suitable implement. If heavy red loam or clay country, or if weeds are prevalent, the rigid tine scarifier should be used. This system of cultivation is carried out until the sowing period approaches.

RETIREMENT OF MR. WINKS.

Mr. R. W. Winks, Senior Grader to the Department of Agriculture and Stock, retired on the 30th June last, through the operation of the age limit, after thirty-four years' service, he having joined the Department in 1893. In the Department Mr. Winks was first associated with "The Travelling Dairy," an institution that did so much to establish the dairying industry in Queensland. Subsequently Mr. Winks was appointed Dairy Instructor, and on more than one occasion had control of the dairying activities of the Department. On the passing of the first Dairy Produce Act in 1904, Mr. Winks took up the work of the grading of dairy products intended for export, and since then devoted his energies to that side of the industry. The introduction of a system of compulsory grading for butter was an innovation in Australia and was naturally resented at the time by many manufacturers and agents. It is a great tribute to the tact, firmness, and competence of Mr. Winks and those associated with him at the outset, that the value of the grading system was soon recognised, and was subsequently adopted by the Commonwealth, and is now unreservedly acquiesced in by all concerned.

In addition to his other public services, Mr. Winks inspected and reported on several properties submitted to the Government under the provisions of the Agricultural Lands Repurchase Act. In this capacity he reported on the agricultural possibilities of the country along the route of the projected railway from Degilbo to Gayndah, and was the first to call attention to the fine volcanic soil on the Binjour Plateau, then covered with dense scrub. The Plateau is now the centre of one of the most flourishing farming communities in the State.

Mr. Winks' valuable work for the dairying industry is recognised far and wide and the following recent reference to the part he played in helping to establish dairying in Queensland is typical of a general appreciation. It is from a former Chief Dairy Adviser and Expert, Mr. G. Sutherland Thomson, F.R.S., N.D.D., now Technical Adviser and Consultant in Agriculture and Dairying in London. He writes, *inter alia*, "We fought a good fight in Queensland and the fruits are being gathered to-day throughout Australia and also in other countries. Tooley street, London, once doubted us, to-day our work is understood and admired."

Mr. Winks comes of a grazing and farming family, his father being the late Mr. William Winks, of Peak Crossing, and formerly of the Darling Downs. In his youth Mr. Winks acquired a knowledge and love of the bush, which he has always retained. His other hobby is literature, and when we say that possibly his knowledge of English classic verse and prose may equal his knowledge of dairying, we are paying him no small compliment.

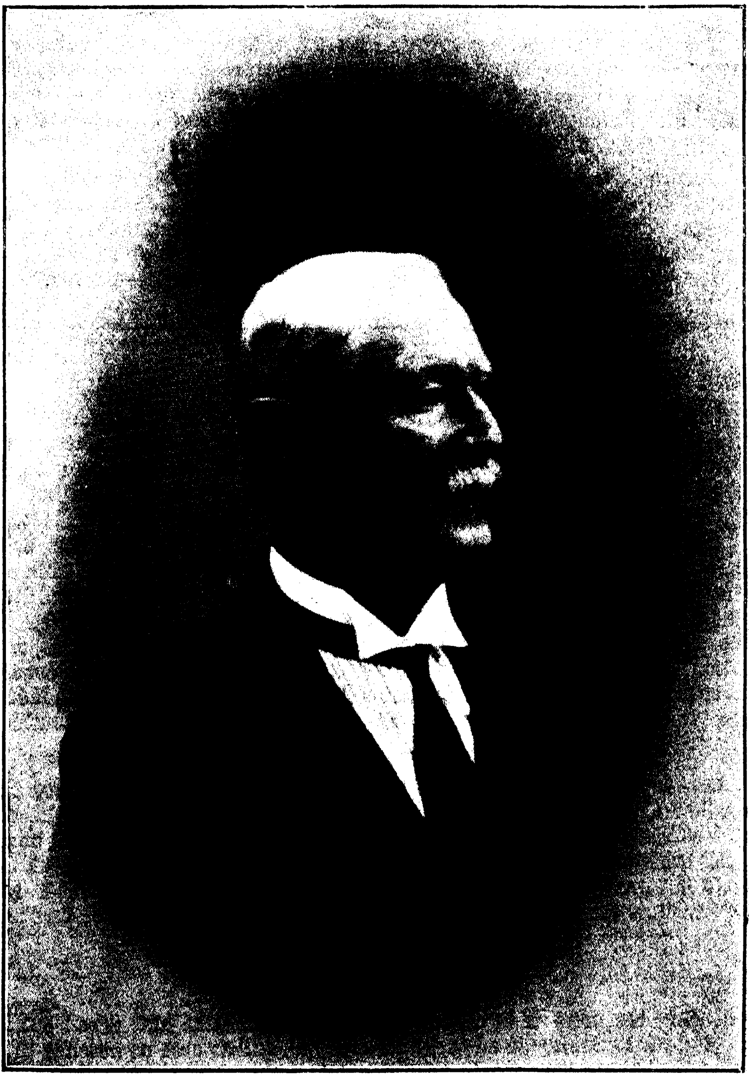


PLATE 11.—MR. R. W. WINKS, WHO WAS RETIRED FROM THE PUBLIC SERVICE ON JUNE 30.

BANANA GROWING IN QUEENSLAND.

By C. N. FREEMAN.

In response to numerous requests we reprint the subjoined note on banana culture, which first appeared in our issue for December, 1924.

The principles of banana culture, as set out, have received the endorsement of the Fruit Branch of the Department of Agriculture and Stock, and are applicable to Southern and Central Queensland, and, with slight modification, the State generally. The instructions given and recommendations submitted cover every phase of profitable banana growing.

The information courteously supplied by Mr. Freeman, being the outcome of personal experience in the Kin Kin district, will be appreciated by both new and old established planters. His advice is sound, and is backed by practical and profitable results, and may be followed without hesitation by growers bent on securing a maximum of material benefit.—EDITOR.

Selecting a Site.

In selecting a site suitable for the growing of bananas great care should be exercised as this is probably the most important feature of the business. A rich friable scrub or bastard scrub soil above frost level is preferred, yet in some forest lands containing a quantity of rotten shale they are found doing well, but in any case there should be perfect underground drainage and the soil must be loose. The banana plant loves warmth balanced nicely with moisture both in the soil and atmosphere, and an easterly to nor'-easterly aspect, close to the sea, with a good annual precipitation, gives these requirements. In abnormally dry seasons well sheltered northerly positions are too hot, but in wet seasons the plant simply revels in the conditions as both heat and moisture are balanced. With the easterly aspect also a plantation is sheltered from the cold westerly winds, but sometimes exposed to the south-east weather prevailing in the wet season (January, February, and March) in which case a belt of scrub should be left standing. One must also consider the capabilities of the site in the transportation of the fruit to the road level.

The best time to fall the scrub is in May or June. It will then have time to dry and allow the bark of the logs to crack ready to be fired in suitable weather in October or November. After the fire all small pieces not burned should be picked up and the ground cleared as much as convenient, and the time thus spent will be well repaid later on. Tracks of from 4 ft. to 6 ft. wide should be made in easy grades to facilitate the drawing of the suckers at planting time and later on the fruit.

Holing.

In digging the holes it is advisable to use sight sticks and a rod cut to the required length for marking so as to get them in line and as near as possible the right distance apart. A big hole should be dug not less than 15 in. wide at the top and bottom, the depth governed by the class of soil. If it be particularly deep and loose 16 to 18 in. is advisable, and if inclined to bake, say, 15 in.; but no hard and fast rule should be set out when digging. In preparing a hole the top soil should be left at the top side as this can be used when planting the sucker. There is a diversity of opinion regarding the distance apart that bananas should be planted, and it is generally conceded that it all depends on the care and method exercised in the suckering. If planted 9 ft. to 12 ft. apart two or three suckers can be left to ratoon, but if planted from 6 ft. to 8 ft. one sucker only can be left, in such a way that one bunch only per year is harvested. The usual practice, however, is to plant 10 ft. to 12 ft. apart.

Selecting Suckers—Planting.

All holes should be dug before the digging of the sucker from the parent plant is proceeded with. Although a sucker takes considerable time to completely dry out or die it is advisable to plant as soon after digging as possible. In selecting a sucker for planting old stools that the grower has decided to allow to run out are preferred to take them from, but the plantation must be clean of weeds, diseases, pests, &c., and the sap flowing freely through the plant, and this time coincides with the time of planting—December-January. In any case suckers should never be taken from plants before or on their first bunch, as they are usually very soft and a great deal of damage is done to the parent and sucker owing to their depth in the ground. The type of sucker to select is one showing a big round corm and a short cone top with no leaves and about as large as the two fists together. It will be found difficult to obtain them all the same size, but desirable to have them as near as possible alike. The crowns of big suckers are satisfactory providing the centre is scooped out and only one leaf left and a good slice of the bottom cut away, as the best roots come away from the level of the eye. These crowns can be cut in two or three sections, providing there is an eye for each section. A good tool for removing the sucker from the stool is a wide spud bar with a long pipe handle. After digging, the roots adhering to the sucker should be cut close up to the corm without damaging it. Remove all eyes from the sucker also.

When planting put the side of the sucker that has been severed from the parent facing down hill so as when the plant grows and the young suckers appear they will be at the back of the plant. The soil on the top side of the hole can now be pulled in and tramped firmly about the sucker or crown, and in the case of very small suckers they can be completely covered but by not more than 2 or 3 in.; in any case the hole should not be filled, and as the suckers grow a hole similar in shape to a saucer should be retained around the plant. This will tend to keep the subsequent suckers and roots well down.

When to Plant.

As mentioned above, December and January are the best months to plant. In the first place the selected sucker is growing and all wounds to the corm will callous up and the plant will strike immediately. They will do this much earlier in the season and later too, but there are other considerations. It is found that the best bunches and best fruit are grown in January, February, and March, and this fruit when harvested for to five months hence will meet the best market, and the fruit can be allowed to remain until fully matured. There is no loss through ripening or boiling, and it will be found that it is approximately twelve months from planting to bunching time if planted at this time of the year. On southerly or cool situations it is preferable that all the planting should be done by the latter end of December. On eastern and warmer sites planting can be deferred until the middle or latter end of January. If planted at this time they will get the benefit of the wet season and be well established ere the winter arrives and will keep growing right through it, providing the situation is warm.

Keep the Plant Growing.

Immediately the planting is finished all weeds should be kept down and not allowed to seed, and the saucer around the stool retained. The plant should be kept growing and not have a check, as this is the most critical stage of its life. Where hard patches of soil are found they should be broken with a forked hoe and whenever holing, the ground must be hoed, and incidentally the weeds, and worked up as deeply as possible. If this is done each time, a deep mulch will be obtained that will retain all quick rains and danger of washing will be lessened. If the soil is inclined to set in spite of this, a good deep fork hoeing should be given in the winter time and the ground left in a rough state and worked down with subsequent chippings. As bananas are usually planted on hillsides amongst stumps, logs, and roots, horse work cannot be practised, and in any case it is undesirable as handwork will give better net results.

Suckering.

In September following the planting a number of suckers will have appeared around the parent. These must be thinned out according to distance apart of the stools mentioned before, and in the case of 6 ft. and 8 ft. plantings one good, deep, hard, cone-shaped sucker retained. If the eyes have been cut away from the parent before planting, and providing it was not large when planted, it will be found that the biggest sucker of the right type will be the one desired. One growing at the back or side is preferred, but if in the front only it can be left, but all subsequent baby suckers of this should be grown at the back as the plant will work too shallow. In the case of 9 ft. to 12 ft. apart, one sucker of the right type left on each side, all others scooped out deeply and never chopped off with a grubber or bar. When in turn these suckers grow, one sucker each should be left. It will be found that before the end of the year more suckers have sprung up. These should again be removed so as not to hinder the growth of these selected. This will occur repeatedly up till winter time, and it is important that there should be only the selected suckers growing. No pruning or suckering should be done in the winter time.

When to Cut.

When the bunch is thrown, a strong prop about 6 ft. long should be inserted in the base of a leaf conveniently situated and the other end pressed firmly into the ground to support the sucker and bunch, and when the flower shields dry and separate from the stem they can be pulled out and the bud cut off the bunch when it has grown away sufficiently from the last hand of bananas. If the bunch is not sheltered from the sun by its leaves it is desirable to break down the last leaf and put the bunch completely in the shade. By doing this the fruit will retain a soft green, all the bananas fill evenly, and be protected from the strong rays of the sun. The fruit should never be cut until it is matured, and that is when they attain a full round appearance, the judgment of which is quickly acquired. In hot weather for far distant markets the fruit must be cut before maturity. In this case the hands should be broken into two small clumps.

Careful Handling Necessary.

After the bunch is cut the leaves of the stalk should be removed leaving the stem standing, as the root system of this will be utilised by the baby sucker and the residue contents absorbed by it. This is particularly valuable in dry time, and wonderful growth of the sucker will be noticed. The bunch should be very carefully handled, in the case of one being carried—by one hand on the stalk end and the other on the flower end. In the case of two, a yoke can be utilised or the bunches carried hanging down at one side, but never carried on the shoulder. Too great a stress cannot be put upon this as it is at this stage that the greatest cause of Blackend or ruptured stem is occasioned. The bunches should be put down carefully, preferably on their side on a thick heap of trash, and covered over with leaves to protect them from the sun.

Where it is possible the bunches should be conveyed to the shed per overhead wires, thus facilitating handling with a minimum of bruising, as the banana is the most delicate fruit grown, the slightest knock showing black after ripening. Where wires cannot be used a slide with well-padded sides and floor can be requisitioned. The bunches should be stood up and placed in firmly so there is no rocking. On arrival at the shed they should be stood up singly on bags to prevent damage to the bottom hand and never heaped one upon the other. If the bunches are allowed to remain over night they will toughen and there will be less staining after being cut off, but bananas will never sweat on the bunch. The hands should be cut off with a small piece of stem adhering so as they can be broken apart easily, and this should be done by a to and fro movement by the packer according to how the fruit lies on the hand. When the hands are cut from the bunch they can be graded as near as possible and placed concave downwards hand upon hand. The grower's packing shed should be floored and the walls built showing no cracks, yet having plenty of ventilation in the way of windows or shutters half way up the wall so as to allow a draught of air to be continually passing above the fruit, carrying away the carbon dioxide which emanates from them. This particularly applies to the summer season. The fruit so handled will be cool when placed in the cases.

Packing and Grading.

At the present time different markets are demanding a different way of packing bananas. It would be an advantage to everyone concerned if a standard pack was evolved and a case label or stencil showing the grade and number of bananas contained therein placed upon the case, as in the case of citrus, apples, &c., but whichever way they are placed in the case it should be done very carefully and tightly, and the grade true in length and circumference. The method which is proving itself on the Sydney market is the single pack, placed on their sides with the stem out, working from one end of the case to the other, reversing each row so that each layer is bound, and when the case is opened on its side for inspection the stem ends are pointing in alternate directions. This is an attractive pack with a big count and carrying well. For Melbourne the desired method is to start the bottom layer with two joined bananas one upon the other, packing very tightly, and subsequent layers in single hands of threes and fours placed concave downwards with singles to fill in where required.

Fruit needed to fill in centre space should be stood on their ends after two layers are packed and outside rows built up around them. In both cases the fruit should be packed tightly and brought above the case a little to show just a fair bulge when nailed up. The nailing of the lids should be done by the aid of a clamp and bumped down.

It is most essential that growers pay the greatest attention to the grading of their fruit, and only that of extra choice and choice quality be sent to the Southern markets. If the bunches are showing only a small percentage of choice grade it would pay the grower to put it on the closest market on the bunch.

When loading lorries or trucks place all cases on their side and not on ends.

Cultivation and Manuring.

After a period of time which is governed by seasons and environment, the banana plant works up very closely to the surface of the soil and becomes prone to the effects of adverse conditions which materially reflect themselves upon the quality and quantity of the fruit. It cannot be said that the soil has been depleted of all its plant food, or, in other words, "worked out" as the accumulation of humus in the form of leaves, bark, &c., from the original scrub or forest has been going on for centuries, but it seems a matter of cultivation and a short period of rest that is needed, together with the breaking up of the old plant and replanting to put matters right. We know that the arrowroot or any other bulbous plant will come almost out of the ground in a very short time, and that when the clumps are broken up and the ground well cultivated a second crop can be obtained almost as good as the preceding one. If the soil was well worked, planted with one of the leguminosæ order of plants, such as the cowpea, &c., eventually turned under in a green state, and generally rested for twelve months, the results would be even better. Whichever way is adopted the holes should be dug in a different place from where the old stools stood, and, after planting, an application of about 5 cwt. per acre of a complete fertiliser spread on the surface about 3 to 4 ft. from the new plant and worked in lightly. A mixture containing for its component parts sulphate of potash, with sulphate of ammonia or nitrate of soda next and a phosphoric acid manure to complete it, is necessary. There are brands on the market containing these. When replanting allowance should be made for the slowness in the growth of the plant compared with the virgin crop, and two months should suffice.

Manuring can be practised without replanting, and if this is desired two applications of the same mixture as above should be given, say, 4 to 6 lb. per stool spread evenly all over the ground, and if the ground has been well cultivated previously, chipped in lightly, but the two operations of manuring and cultivation could be done simultaneously. The fertilising mixture given above is quick acting, and should not be applied to a dry soil, and only when the plant has ample moisture requirements. The best months to fertilise are August and December.

Thoroughness the Watchword.

Banana growing is very fascinating as the plants respond to good treatment, and is the means by which a conscientious man with small capital can make a start on the land without having to wait very long for a return; and as it is usually carried on in districts with a good and regular rainfall, risk from failure through bad seasons is reduced to a minimum. But planters must apply themselves intelligently, make "thorough" their watchword, and do the right thing at the right time all the time.

THE JOURNAL ON THE "RENOWN."

In the course of a letter to the Editor from Perth, Western Australia, Mr. P. K. Hodgson, C.M.G., O.B.E., Private Secretary to His Royal Highness the Duke of York, referred very appreciatively to the "Queensland Agricultural Journal," copies of which he had seen.

"They are most interesting," he said, "and I will take an early opportunity of laying them before Their Royal Highnesses."

PRODUCERS' PROBLEMS.

COUNTRY INFLUENCES ON NATIONAL DEVELOPMENT.

Following are points taken from a recent public address of the Federal Treasurer (Dr. Earle Page):—As two-thirds of the present production of Australia and 96 per cent. of her exports were primary, the importance of country influence in the determination of a national plan could not be over-emphasised. Excessive centralisation, with consequent waste in the production and marketing of goods, seriously handicap Australia in world competition. Federation offered unique opportunities of bringing about practical decentralisation. The industrial revolution of the nineteenth century, which was founded on steam, drove the people into the cities. The industrial revolution of the twentieth centry, which tended to be an electrical development, might easily scatter the people over the countryside again, if a national view of industries could be taken and a national policy outlined. Country influences should be the most important in deciding the main lines of such a national policy.

Shortest Way to Market.

Most of the big development problems were interstate, continued the Treasurer. If they discuss irrigation, they found that the Murray River basin was in four States. When considering power-development, they saw that the headwaters of the Murray, the Snowy, and the Clarence, in each case, touched at least two States. They were not utilising some of the best natural ports, because they were on the borders of States, and because of an absence of an interstate and inter-district transport. The successful marketing of Australian goods depended on the shortest and most economical route to market being adopted and on the best means of distribution being devised. How could they ensure the prosperity of the countryside, stimulate the development of country towns, and maintain agriculture in its proper place? The first step was the initiation of a national plan of efficiency in production and marketing that would ensure balanced development. The tariff was used to afford protection to industry generally. They must therefore be prepared to frame a tariff which would protect primary industries as effectively as secondary, and would stimulate their consumption, while organising marketing and distribution to ensure the maximum return and the smallest margin of cost between the producer and the consumer. The more direct they made the road to market the better the farmer's position. The list of imports into Australia last year showed practically £12,000,000 of agricultural products and groceries. The necessity of bringing those goods into Australia indicated a lack of method.

Building Country Industry.

To be of the greatest value to the farmer, continued the Treasurer, the industries which would largely absorb raw materials in factories or would promote consumption of the necessaries of life should be located as close as possible to the source of the raw products. That necessitated building up country towns and creating new centres of commerce and industry and new trade routes. Power systems whose capital was founded on the public credit must be prepared to sell electricity at the same rate in the country centres as in the big cities. As differential railway rates had militated against country development, in the future they must fight for differential rates favourable to the establishment of country industries and manufactures. Proper allowance must be made for the healthier, cheaper, and better living conditions in the country in determining the effective wages to be paid in rural industries.

The first effort at a solution of the farmers' problem must be made by the farmer himself, though that effort must be backed by public action. Farming operations must show the greatest efficiency, from the beginning of production to the end of marketing, to show satisfactory final results. In Australia the individual pastoralist has shown what could be done by increasing the weight of his fleece by judicious breeding; the wheat farmer had increased the yield by scientific cultivation and wheat selection; the dairyman had systematically improved his herd, and what has been done by a few must be done throughout the whole of primary industry. Taxes must be adjusted according to the farmer's ability to pay and to the changing conditions of modern life. A graduated income tax to some extent straightened out some inequalities, but more should be done in the way of taxation concessions to the primary producer, especially as much as his product was exported and did not command an Australian price like the goods of the merchant or the manufacturer. The public could also assist the farmer by giving him appropriate machinery of finance and marketing. The Government, however, should give him every assistance to build up his co-operative movements which tended to help and benefit all other business interests in so far as they stabilised agriculture.

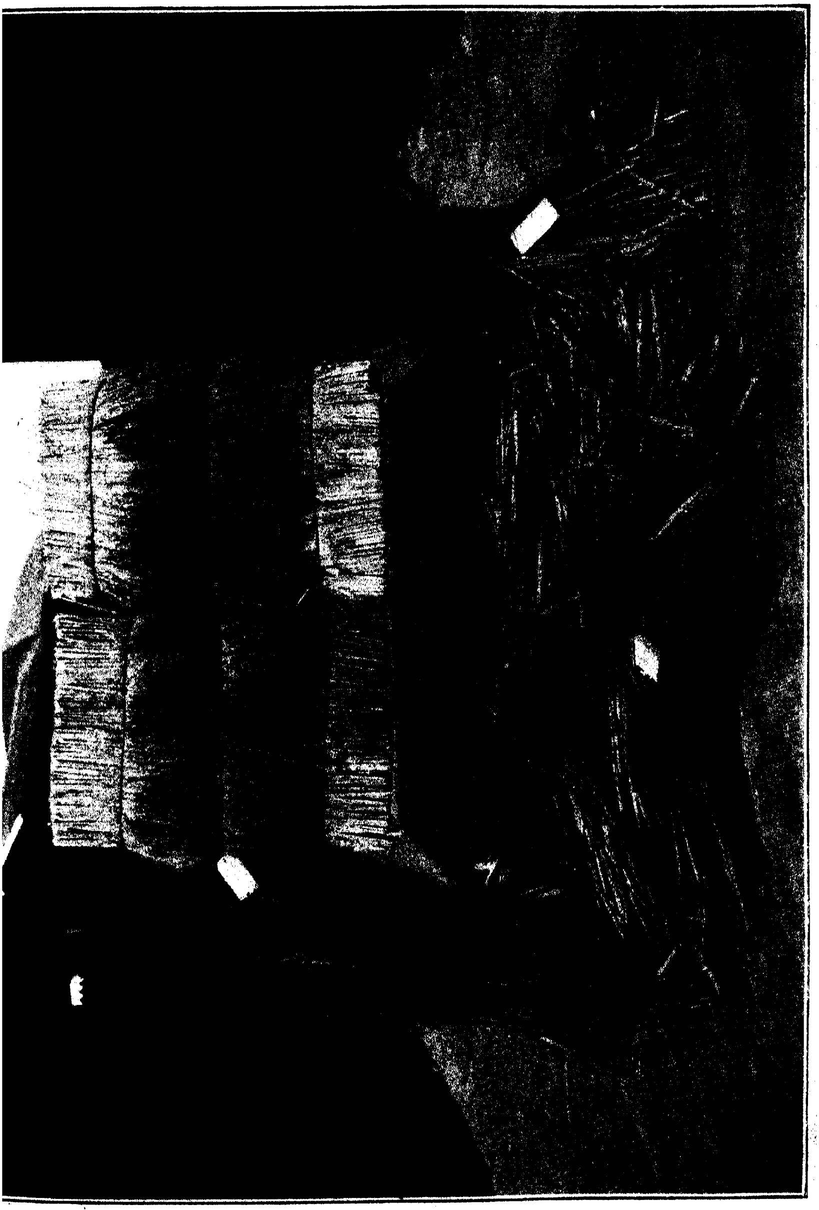


PLATE 12.—A COMPARISON IN BROOM MILLET BALING.

Top: How it should be done. *Bottom*: How it shouldn't. The picture shows how two separate consignments were received at the State Produce Agency, Brisbane.

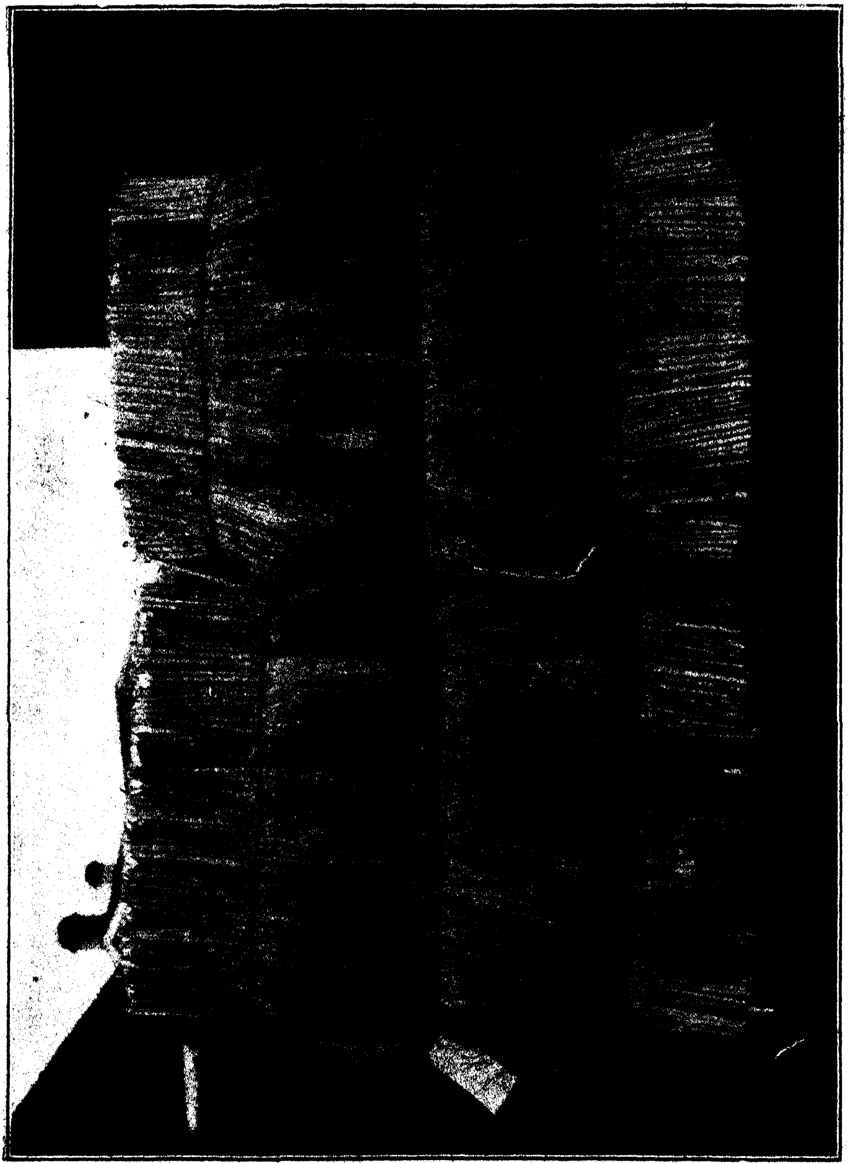


PLATE 13.—TWO WELL-PACKED BALES OF BROOM MILLET RECEIVED AT THE STATE PRODUCE AGENCY, BRISBANE.

PRESERVES.

By MARGARET A. WYLIE, Inspectress and Organiser Domestic Science, Education Department, Western Australia.*

The subject of fruit preserving is of interest to the keen housekeeper. Several methods occur instantly to the mind—drying, candying, and lastly, bottling, amongst others. The latter method will be the topic of these short notes. The primary object of all these methods is to so protect the fruit that harmful bacteria will be unable to cause decay, through the breaking down of the fibre bringing about fermentation.

"Processing" is the term applied to the operations of first sterilising, or sufficiently heating to destroy bacteria; and secondly, excluding air so that bottled or canned goods will keep. The utmost cleanliness must be observed in the care and attention to detail with regard to equipment, as well as to the actual "processing" itself.

Fruit.

All fruit should be prime and in full season, graded to suitable size for the bottles to be used.

Initial preparation consists in washing the fruit quickly, and then proceeding as follows:—

1. Peel apples and pears, and dip in salt water.
2. Quarter core, and pack as compactly as possible.
3. Dip peaches into boiling water. This ensures the skinning easily. Cut in half and remove stones. Pack compactly, overlapping edges.
4. If apricots and nectarines be large, cut and halve; plums and berries bottle whole.

Equipment.

The jars which are capable of being hermetically sealed give the greatest success. They are so constructed as to form a vacuum during the heating process. The inside air is driven off by the intense heat, whilst the pressure of the heavier air outside prevents the lid from lifting, ensuring that the contents are air-tight.

Full directions for preserving along these lines accompany Fowler's Sterilising Outfit.

Other bottles or jars in common use are glass-topped jars, provided with wire clamps attached to necks; also screw-topped jars with aluminium lids. New rubbers are essential. Secure the best and see that they perfectly fit the jars. They dry and deteriorate with age, even if only used once. The lids of the bottles should be carefully examined; any with flaws or even pin-prick holes should be rejected. Lacking a Fowler's Outfit one may use a large boiler, or washing copper, for holding the bottles during sterilisation.

Sugar is the great preservative, but water which has been sterilised, *i.e.*, brought to a boiling point, may be substituted if sugar is scarce. This latter is used in the form of syrup. A suitable syrup is made in the proportion of three or four pounds of sugar to one gallon of water—boiled for ten minutes, then strained, if necessary, and allowed to cool.

Procedure.

1. Fruit treated as detailed above and packed in the jars.

2. Pour over it the sterilised cold water or syrup, slowly, allowing liquid to sink well down, thus avoiding air bubbles. Fill to brim.

3. Fit on rubbers in groove of neck of the jar. Fit or screw lids evenly on top. A slab of wood should be placed at the bottom of the boilers to permit bottles to stand evenly, preventing contact with the boiler itself.

4. Place bottles in boiler, about one inch apart, in cold water reaching about half-way up the bottles. (No packing is required when the wooden slab is used.)

5. Bring water slowly to boiling point. Allow to boil half an hour, or longer for hard fruits. This is termed the quick method.

6. A slow cooking gives better colour, less broken fruit, and a clearer syrup, and is done by keeping the water round the bottles at simmering point for about two hours.

---

* In the "Journal of Agriculture," W.A., March, 1927.

7. Remove bottles, thoroughly tighten lids of screw-topped jars, and ensure that clips of the other types remain untouched, until fruit is perfectly cold.

8. Test jars to see if air-tight by turning upside down. If syrup oozes from lid, tighten again.

N.B.—When using screw-topped jars, it is advisable to have an extra bottle filled with syrup alone, sterilised with the others, and kept at same temperature. From this, the bottles of fruit may be refilled, if evaporation has taken place.

Reasons for Fruit Rising in Jars.—(*a*) Imperfect packing; (*b*) a sudden rise in temperature; (*c*) too great heat; (*d*) too heavy a syrup.

Other homely methods of bottling are as follows:—Proceed as above detailed in packing and using sterilised water or syrup. Then fill jars to overflowing; fix rubbers and lids; place in cold oven, light fire, heat gradually, and when fruit shows signs of slight shrinkage, remove from oven. Screw lids tightly, turn upside down testing for leaks, &c.

Still another method is to have two pans containing syrup. Bring both, at the same time, to boiling point. Into one, place just sufficient fruit to be thoroughly immersed, and cook till tender. Lift carefully, and pack cooked fruit in bottles. Fill with syrup from other pan to overflowing. Affix rubbers and rings, securing these tightly. This method is unique in that the fruit is only handled once.

The bottled fruit should be kept in a cool place till required.

PEANUT GROWING.*

An Australian market for the local grower seems to be now assured in the peanut-growing industry.

For the purpose of protecting the industry in this country from introduced diseases, the Commonwealth Government has prohibited the importation of peanut plants or seeds, except by permission of the Minister for Health.

The attitude of the Federal authorities is that the importation of peanuts should be discouraged as much as possible, and importers have been warned that permission to import will only be given in exceptional cases. As a matter of fact, importers have been advised to make arrangements at once for discontinuing importations.

The peanut-growing industry has always been retarded in Australia by the ineffective tariff on the nuts, which until recent years could be more cheaply imported from countries such as China, Africa, and Java. With an increase in the tariff, importers commenced to pay attention to the possibilities of fostering the local product, and with the partial protection thus afforded farmers attempted the growing of peanuts on a commercial scale. With the full protection now given the industry, the general prospects and market requirements are worthy of earnest consideration.

Market Requirements.

When a few years ago peanuts were used almost solely in the roasted form they were mostly imported from China, and about 1,500 tons were consumed in Australia annually. The consumption is still about this figure, but it is now about equally divided between peanuts for roasting and peanuts for the confectionery purposes previously mentioned. It is expected that when peanut butter, peanut flour, and the other manufactured products or confections become better known the demand for peanuts will increase greatly.

In America the per capita consumption of peanuts is about 10 lb. per annum, and if Australia used peanuts at the same rate the annual consumption would be 25,000 tons—more than sixteen times the present figure.

Moreover, in America, an area equal to that grown for the nuts is devoted to peanuts for "hogging down," and it is expected that this practice will increase in Australia when peanuts come to be grown on the poorer soils. A serious drawback to fattening pigs exclusively on peanuts is that they produce a greasy, soft pork, but this disadvantage can easily be overcome by supplementing the diet with maize and other feeds.

Under existing conditions in Australia it is very doubtful if planting peanuts on good maize land for the express purpose of feeding off would pay, when the ruling market price for peanuts and pork are about equal. Circumstances (such as a shortage of labour, an unfavourable market price, or a wet harvesting period) may arise which would make feeding off preferable to marketing the crop. Even when the most careful harvesting methods are practised a number of the nuts always remain in the soil, while others are left on the surface, due to shattering when handling the vines. These can be put to profitable use by turning the pigs into the paddock to clean up the residues. Whenever practicable, this system is worth adopting, for not only are the crop residues turned to profitable account, but the cropping capacity of the soil is also improved, both mechanically and chemically.

---

* From notes recently issued by the New South Wales Department of Agriculture.

Buyers want High Quality Nuts.

The imported article is usually of high quality, being well graded by the cheap labour available in such exporting countries as China. Even though the competition of such countries has been eliminated, local producers must not imagine they will be paid the same price as was paid for the imported nuts unless their produce comes up to the same high quality. However, the price which is being offered at present has proved satisfactory to some growers, and farmers can best determine by growing an acre or so of peanuts whether the crop is more profitable to them than their usual crops.

A Sydney firm offered the following price, ex rail Darling Harbour, per the 1926 crop of White Spanish nuts according to grade:—Grade 1, f.a.q., containing 70 per cent. or more of sound No. 1 kernels, 4¼d. per lb; grade 2, 65 to 70 per cent., 4d.; grade 3, not less than 60 per cent., 3¾d.

No. 1 kernels must be dry, mature, free from vermin mould, sticks, stones, and other extraneous matter.

The prohibition of imports coupled with the above offer should definitely ensure the establishment of a large peanut-growing industry in Australia, and there is no reason why, when the high value of peanuts as a food in the different forms becomes more fully known and appreciated, the industry should not become as relatively important here as it is in America.

As to details concerning the culture of the crop, growers and intending growers could not do better than consult officers of the Department of Agriculture, Brisbane.

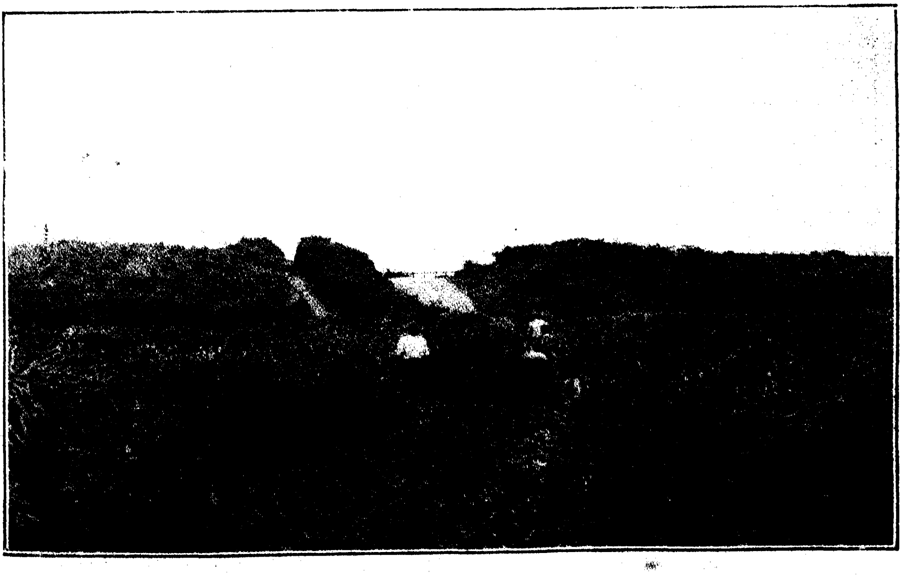


PLATE 14.—WATER HYACINTH DEPOSITED BY FLOOD WATERS ON THE ROAD FROM SUGAR EXPERIMENT STATION, MACKAY.

POULTRY DISEASES.

By P. RUMBALL, Poultry Expert.

To the poultry-raiser the question of diseases and pests is of considerable importance, and that the economic effect of these troubles upon the industry is not lost sight of by the Department of Agriculture and Stock is instanced by the recent appointment of a committee to investigate and report upon the best lines of attacking the various diseases and pests which are common to the poultry industry in Queensland.

The personnel of the committee is:—Major A. H. Cory, M.R.C.V.S., Chief Inspector of Stock, chairman; Mr. C. J. Pound, Government Bacteriologist; Mr. P. Rumball, Government Poultry Expert; Mr. M. H. Campbell, chairman, Queensland Egg Board; and Mr. James Hutton, member Queensland Egg Board.

As an outcome of the committee's deliberation, articles upon diseases investigated will appear from time to time in this Journal, but the writer, in the interest of the poultry industry, desires to bring before the notice of poultry-raisers the necessity of taking measures that will increase the resisting powers of stock and methods that should be adopted for the controlling of disease when an outbreak occurs.

Diseases of all forms are caused by definite organisms. These organisms are frequently present in the soil or buildings upon the farm, or they may be carried from other farms by birds of the air, new stock purchased, crates, implements, &c. They may also be carried from a farm where disease is present to a clean farm by adhering to the clothing of the human being. Although disease organisms may be present it does not necessarily follow that outbreaks will always occur, although the chance of such is greater. The general health of the stock and sanitary conditions are the best insurance against outbreaks.

Correct feeding, freedom from internal and external parasites, and proper housing are conditions under which stock retain their greatest resisting powers against disease organisms and therefore are of primary importance.

Nutrition and General Stamina of Stock Important.

The nutrition of stock, more particularly during dry periods and high-priced foods, is an important feature. With the high cost of feed, breeders are possibly tempted to cut the ration down to a minimum, or feed inferior classes of food, with the object of reducing their feed bill. This frequently results not only in lowered production of adult stock, but, what is of greater moment, the undernourishment of young growing stock with the consequence of the lack of physical condition. A long dry spell is also responsible for the lack of green feed, a food which is highly essential as an economical method of supplying an element of food known as vitamines. This element is necessary for the maintenance of the best physical condition. These combined reduce the resisting power of birds and make them easy victims to disease organisms; but it is not necessary that this should be so, as we have foods that will supply the wants in lucerne, chaff, or meal, buttermilk powder and cod liver oil. Buttermilk powder, it is admitted, is difficult to obtain at times on account of the effect of the dry conditions upon the dairying industry, but lucerne chaff of good quality is practically always procurable. Prices are high but its feeding value warrants its purchase, and the inclusion of, say, 12 per cent. in the ration will supply the requirements of poultry. This chaff is better soaked over night and fed with just sufficient bran and pollard to absorb the moisture.

Internal and External Parasites.

Worms, mites, and ticks are three of the most common parasites met with in the poultry industry. They individually and collectively cause a heavy mortality; the latter on account of the fever they cause and the two former on account of the weakening effect they have, thereby rendering the birds more susceptible to attacks of disease. They can, however, be kept in check, and mites entirely eradicated. It means work, but without work nothing can be achieved. However, in order to keep them in check, it is as well to know something of the habits and life history.

Worms.

There are many varieties of worms. One makes its home in the crop, another in the true stomach, another the gizzard, others the intestines, and others the blind gut or cæca. The round worm is the most prevalent and is responsible for most of the troubles due to worms among poultry. The life history of many is

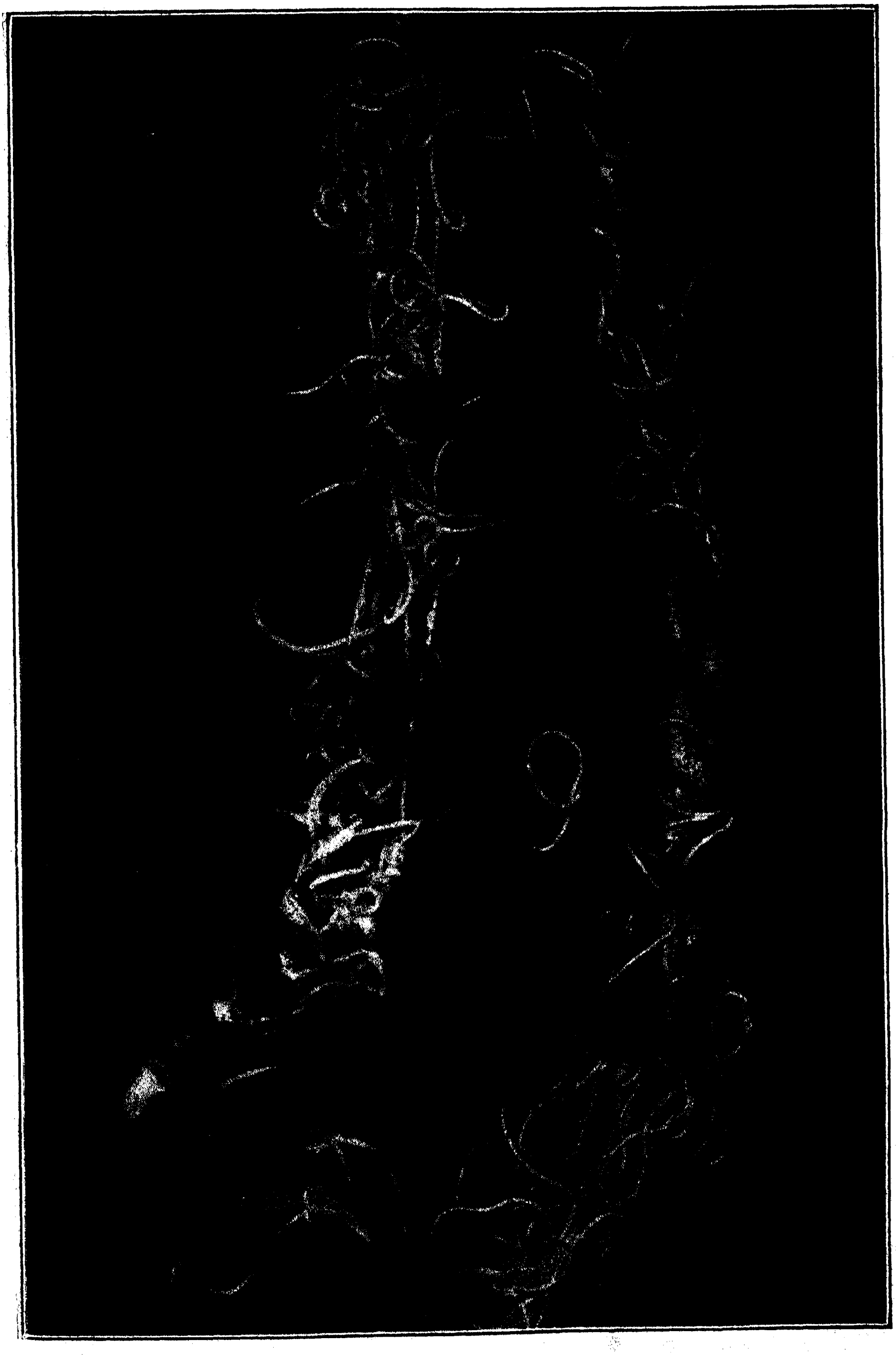


PLATE 15.—PORTION OF INTESTINES OF FOWL INFESTED WITH WORMS.

This interesting photo. of worm infestation was obtained by the writer from a white leghorn pullet. The owner had requested the Department of Agriculture to advise on the treatment of his flock for roup. There was no doubt that the low condition of the birds was largely responsible for their susceptibility to the disease, and all those that were opened for examination showed severe worm infestation Outbreaks of disease among such stock must be expected.

not known, but briefly that of those which are most common is: The egg is laid by the worm in the digestive tract, voided with the excreta, undergoes partial development in the soil, picked up by poultry adhering to particles of food, and incubation is completed in the digestive organs. Worm remedies are not too effective, 65 to 70 per cent. efficiency being given by some authorities, therefore the breeder should not pin his faith to medicants, but rather take precautionary measures.

Knowing that worm eggs are voided by infested birds it will readily be understood that a sanitary yard and feeding grounds will be one of the best methods to adopt. This method is fairly satisfactory with adult stock, but experience teaches us that young growing stock are very susceptible to the attacks of worms, they causing the birds to become very weak and in many cases are responsible for heavy mortality. Knowing this, we then should strive to rear our young growing stock upon land which has not been overrun with old birds, and the land should be spelled from one rearing year to the next.

Mites.

Mites are well known to most poultry-keepers, but the damage they cause is often overlooked, or it would appear so from the condition of many poultry houses. These mites not only come from their places of concealment during the night to suck the blood of their host, but when the house is heavily-infested they may be found upon the birds during the day. The sucking of the blood has a very weakening effect upon the bird, but it is possible that equal damage is done by the irritation and lack of rest they cause. They can readily be kept in check by attention to perches, nests, and broody hens. The broody hen provides a convenient host for the mite for the twenty-four hours of the day, which enables them to multiply more rapidly than otherwise; therefore, it is a good policy to have broody coops and to use them immediately broody hens are found. When the infestation is mild the painting of the perches with a little kerosene and waste oil will keep mites down. Wood-preserving oil and creosote are also very effective, but, if infestation is severe, weekly spraying of the house floors, &c., should be practised. The most economical spray is a kerosene emulsion. This emulsion is made in the following manner:—Boil up a pound of good soap in 1 gallon of water, when boiling remove from the fire and add 1 gallon of kerosene, stirring well to ensure a thorough emulsifying; to this another 8 gallons of water can be added. Use this spray freely; it is both cheap and effective. Soft water only should be used to obtain the best mixing of the water, soap, and oil.

The Poultry Tick.

The mortality the poultry tick frequently causes generally induces producers to give it a certain amount of respect, and the inclusion of it in the article is therefore not necessary. Producers, however, desiring information upon the tick should communicate direct with the Department of Agriculture and Stock.

Accommodation.

With the addition of large numbers of young growing stock generally present on the average poultry farm during certain seasons of the year, the housing accommodation is usually overtaxed. This means there is not the supply of pure fresh air in the sleeping quarters essential to maintain the birds in the best of health, and it is possibly due to this cause alone that many outbreaks of disease occur. The actual space required by the individual bird in a poultry house used for roosting purposes only naturally varies according to the length and depth of the house. We can, however, space our roosts at a definite distance and by doing so make for a better circulation of air, thereby ensuring to a large extent a pure air supply. Perches should be spaced at least 20 inches apart, the number varying according to the depth of the house. It is also as well to try and house young growing pullets in relatively small numbers—say, fifty in one shed. Whatever kind of shed is built, ventilation should be provided by leaving a space of 3 inches to 6 inches between the top of the back wall and the roof. The floor should be kept dry by providing good drainage, and finally the regular cleaning of the house and removal of droppings are essential.

Controlling Disease.

Owing to the relative low value of the individual bird and the rapidity with which disease spreads among poultry, more particularly where specialised poultry keeping is carried on, methods of control or the prevention of the spread of the contagion is of greater importance to the poultry-raiser than the diagnosis and treatment. By this it is not meant that diagnosis and treatment are not necessary, but the prevention of the spread of disease is of major importance.

Diseases in poultry, as stated previously, are caused by a specific organism of some form, and it is known that disease is spread from bird to bird in most cases either through food and water supply coming in contact with excreta in which diseased organisms are present, or the food and water supply being contaminated by a mucus discharge from the eye, nostril, or mouth of diseased stock.

This being the case, it should be patent to any person engaged in the rearing of poultry that the removal of visibly-infected birds is the first essential, and that every effort must be made to detect sickening birds and to reduce the infection of premises and utensils to the minimum. To do this the following points should receive attention:—(1) Size of flocks, (2) housing, (3) feeding, (4) water supply, (5) disinfection.

Size of Flocks.

With commercialised poultry farming the birds are frequently kept in large flocks, and it is not intended in the following remarks to discount this economic principal of poultry farming. In a flock of, say, 100 hens it is relatively more difficult to detect a sick bird than in a flock, say, of 50, and it is therefore suggested that during outbreaks of disease of a highly-contagious nature the poultry farmer should endeavour to split his flock into as small a unit as possible, as the detection of the sick bird is of primary importance in preventing the contamination of the premises. It is recognised that on the great majority of poultry farms, more particularly during the season when diseases of an epizootic nature are present, housing accommodation is taxed to its limit; but even the partitioning off of houses and yards with wire-netting will suffice to split the flock into small numbers, thereby enabling the attendant to run his experienced eye over his birds in a few seconds every time he passes through the yards and houses.

Housing.

All types of houses and yards are met with, but that frequently used is the intensive house. Under the intensive system litter is provided to promote exercise, and under normal conditions it is left in the shed for several months. There are no harmful results from the practice under such conditions, but during an outbreak of disease the supply of litter should be limited and renewed every week. The floors of such houses are frequently the natural soil. This becomes under the best conditions contaminated to a depth of several inches, and occasionally 4 to 6 inches should be removed and new soil put in its place, but during an outbreak of disease this should receive attention after the removal of affected stock.

Where houses and large runs are used little in the way of treatment of premises can be practised while they are occupied with stock. Contamination is very widespread under such conditions, and the treatment of the soil in the yards is all that is possible. This treatment could consist, *after removal of all stock*, of spreading quick-lime over the pens at the rate of about a ton to the acre, but it is as well to add that quick-lime cannot be used in pens where stock are still present.

Feeding.

The method of feeding is either wet mash and grain or dry mash and grain. Wet mash is fed in troughs or receptacles of some form and allowed to remain in the pens for about an hour and that unconsumed removed. With dry mash, the hopper containing the food is open all hours of the day. With the wet mash there is a natural scramble of the healthy birds for this food, with a very poor chance of the sick bird getting near the trough until the majority of the stock have had their fill, while with the dry method of feeding the sick bird can go to the hopper at any hour of the day and contaminate the general food supply either by coughing infected material out—particularly is this so in the case of roup—or by excreting in the hopper. Knowing this it would then be a wise precaution to change from dry to wet mash feeding during outbreaks of disease, as it not only protects the food supply but permits of the feeding utensils being disinfected daily. The attendant also can more readily detect the ailing bird at feeding time, a healthy bird rushing the feed, while those not in such condition will be found to hang back. Then there is the practice of feeding grain in litter or scattered about the yard. This method has its advantage inasmuch that it helps by promoting exercise, or keeping the bird fit, but during the period when disease is present it would be better to feed grain in troughs than spread it among contaminated litter and soil. The drinking water can be considered one of the principal methods for the transmission of all forms of roup, &c., owing to the fact that the water vessels are available to the fowls at all hours and the manner a fowl has of drinking. With most diseases a slight fever is generally present causing the fowl to make repeated visits to the water supply, swilling out her mouth and dribbling over the water, possibly contaminating it with thousands of bacteria. The medicating of the drinking supply with some substance which would destroy the organism would appear to be the solution of this trouble, but what of the effect upon the birds?

Any medicament of any value for the purpose of which the writer is familiar with makes the water that disasteful that the birds refrain from drinking, with the result of a very much reduced egg yield. Although spread of disease is checked through this source the financial loss to the poultry-keeper is generally more than he can comfortably stand. Medicating the water, therefore, is only advisable with young stock not in lay and birds which have gone off the lay on account of sickness. What has to be done with the water supply for layers is to renew it at frequent intervals, to disinfect the utensils, and to keep it in as cool a place as possible.

Disinfection.

The majority of poultry breeders use disinfectants freely. It is not so much the kind of disinfectant as the manner in which it is used that gives the results. For instance, if we run over the house, say, with a watering-can, giving the loose soil and excreta lying around a good sprinkling with any disinfectant used, how far will it penetrate?—in a state in which a poultry house should be, perfectly dry—no deeper than one-eighth to a quarter of an inch. This it will readily be understood is of little value. Diseased organism may be present several inches down in the litter and loose soil and is soon brought to the surface by the birds in scratching around. A good preliminary cleaning is essential before any disinfectant is used. Any litter and loose soil should be removed, all droppings cleaned from the perches and dropping boards, mixed with quick-lime and dumped upon the manure heap. If the floor of the house is of earth a few inches are better removed, and when this is done the poultry breeder can disinfect with the aid of a good forced spray with the knowledge that his work is being effectively done.

DURUM MAIZE.

A SPECIAL STRAIN OF SEED BEING DEVELOPED FOR THE ATHERTON TABLELAND.

Commenting on development work connected with the maize-growing industry on the Atherton Tableland, the Acting Premier and Minister for Agriculture, Mr. W. Forgan Smith, said recently that it was of interest to note that this was the first district in Australia to adopt modern methods for the treatment and storage of its maize in reinforced concrete silos, and up to the present it was still the only place where conveniences of this character had been installed, specifically for maize. The district is an exceptionally rich one, and is well served by rail and road communication with Cairns and the coast.

Although the average yield per acre of maize is higher on the rich volcanic soils of the Tableland than in other districts of the State, some little difficulty has been experienced in maintaining a hard-textured grain, and producing a type of maize plant possessing the botanical characteristics calculated to meet the existing climatic conditions.

For some little time officers of my Department have been engaged in developing a special strain of seed and type of plant for the Tableland, and in order that practical expression might be given to this very important form of research work, it was decided at the beginning of last season to initiate a Seed Maize Improvement Scheme for the Atherton district, and to engage in the production of supplies of seed for distribution each year.

Upwards of 50 acres were cropped this season, and I was much impressed with the sample of seed maize brought from the Tableland a few days ago by the Director of Agriculture. This strain, which is to be known as "Durum Maize," is of characteristic hardness and of excellent type and quality.

The good work already accomplished will be followed up. The Maize Pool Board at Atherton is keen in its efforts to advance the interests of growers, and to bring about that co-operative spirit which will lead to the consummation of my desire to encourage those engaged in this important industry.

It is not purposed to distribute seed maize for general planting from this year's crop beyond certain proposed extension work which the Department has arranged for.

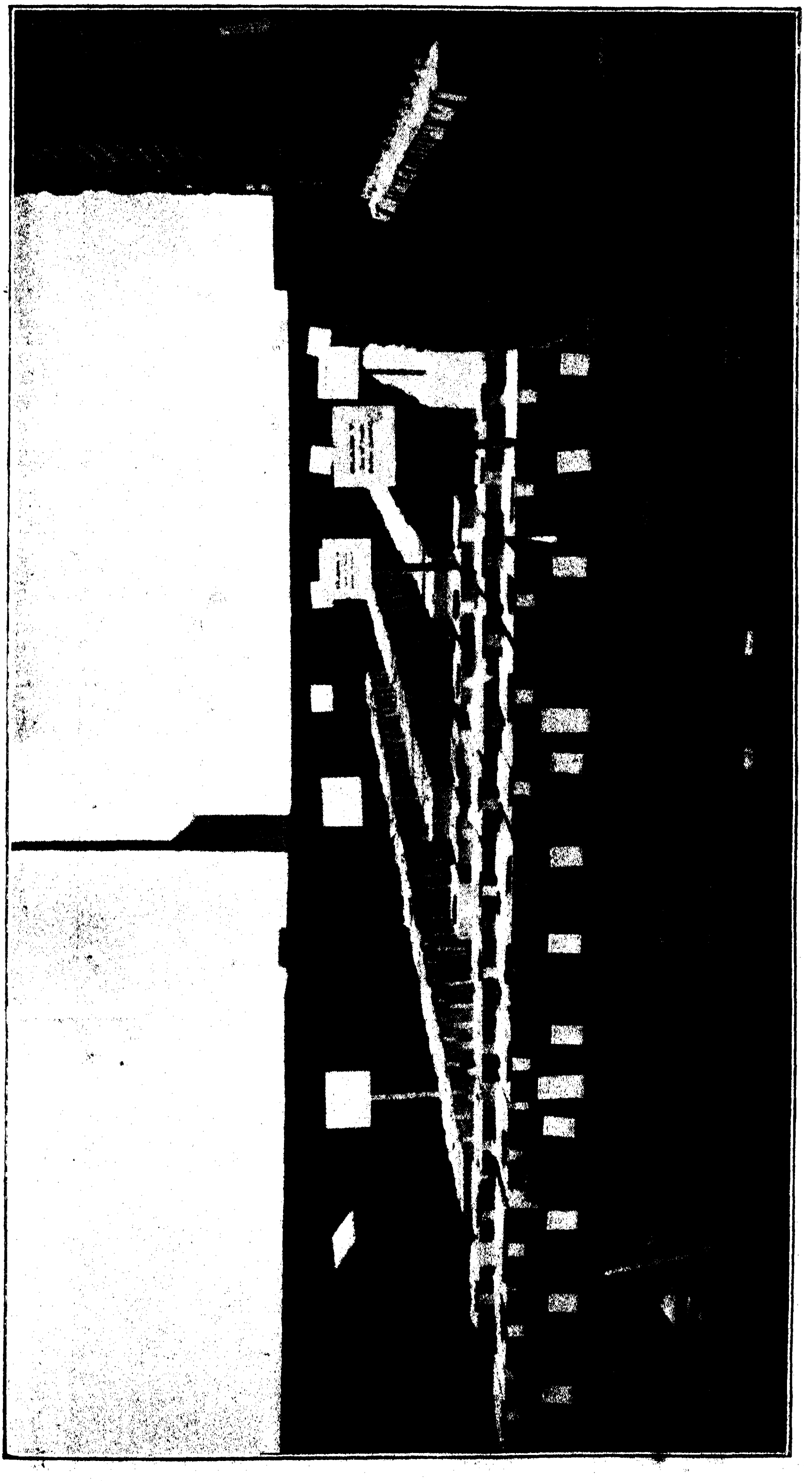


Photo.: Department Agriculture and Stock.]

PLATE 16.—Butter representing 189 different makes exhibited in the Butter-grading Room of the Hamilton Cold Stores at the recent Show conducted by the Queensland Butter and Cheese Factory Managers' Association, 1927 Annual Show and Conference.

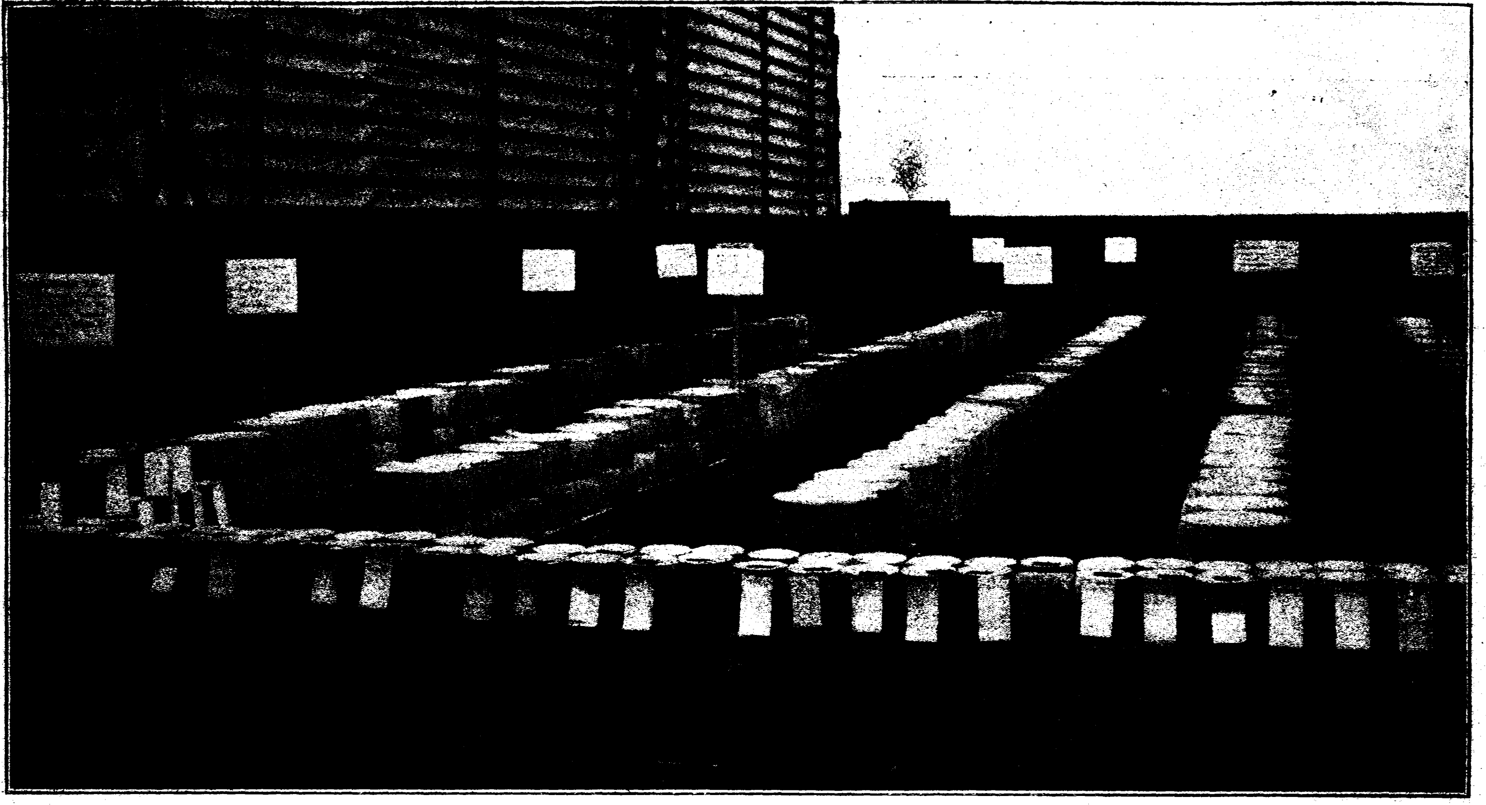


Photo.: Department Agriculture and Stock.]

PLATE 17.—316 samples of Cheese exhibited in the Cheese-grading Room of the Hamilton Cold Stores at the recent Show conducted by the Queensland Butter and Cheese Factory Managers' Association, 1927 Annual Show and Conference.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, has been taken from the "International Review of the Science and Practice of Agriculture," published at Rome by the International Institute of Agriculture.

Preservation of Perishable Fruits and Vegetables.

OVERHOLSER, Prof E. L. (University of California). "Refrigerating World," vol. 60, No. 7, pp. 25-26. New York, 1925.

It is well known that fruits such as figs, apricots, and peaches cannot be kept long in the fresh condition at cold storage temperatures of 32 deg. F. to 35 deg. F.

The author carried out investigations from which the following conclusions were drawn:—

Strawberries, raspberries, loganberries, blackberries, cherries, figs, apricots, peaches, currants, and gooseberries, frozen at 10-12 deg. F., in water or sugar solution, or crushed with or without sugar, in closed containers, were kept for a year without deterioration of colour or flavour.

Freezing with dry sugar kept quickly-perishable fruits for use in pastries, ice cream, jams, &c.

Shelled fresh peas and asparagus have been frozen in water and subsequently cooked and have retained the flavour of the fresh material.

Fruits frozen in 30 to 40 per cent. sugar solution were as excellent as fresh fruit.

Cold Storage of Oranges.

HARRISON, J. E. "Journal of Department of Agriculture of Victoria," vol. XXIII., Part 7, pp. 428-432, tables 7. Melbourne, 1925.

Experiments on the cool storage of Washington Navel oranges were carried out to ascertain the conditions which retard or develop the growth or mould in storage.

The value of sweating was studied; the process being carried out at a temperature of 70 deg. F., until the skin of the fruit was soft and pliable. Wrapping the fruit in paper had little influence on mould development.

As a result of the experiments it was found that:—

(*a*) The process of sweating offers the best means of guarding against the outbreak of mould in cool storage.

(*b*) An average temperature of 32 deg. F is unsuitable, owing to the danger of freezing.

(*c*) The average temperature of 34 deg. F. will avoid the danger of freezing and gives less mould than higher temperatures, and is recommended.

(*d*) The fruit from different districts varies in keeping quality.

Some Observations on the Condensation of Dew on the Land.

E. BIGINI. "Le Stazioni Sperimentali Agrarie Italiane, vol. 59. Fasc. 4-5, 6-7. Modena, 1926.

Little is yet known of the amount of moisture which can be supplied to plants by dew, either directly through the leaves or indirectly by the earth. It is well known that there is a considerable condensation of dew in hot climates and it is apparently heavier in spring and autumn.

The author has carried out his experiments on various kinds of soil, particularly on red alluvial and tufa soils, in order to prove whether the formation of dew varies according to the composition and formation of the soil. His conclusions are as follows:—

The condensation of dew differs in a marked degree according to the nature of the soil. Red alluvial earth in every case condensed more dew than grey tufa earth. Just as a connection probably exists between the structure of the surface and dew, in the sense that heavier dew falls on more compact soils, so there may also be a connection with the contents of component parts which increase in volume with the absorption of water—*e.g.*, clay in as far as it retains water with greater tenacity.

There may also be a connection with heat, because dark soil heats more readily in the sun and cools more quickly by irradiation.

There was the greatest condensation of dew on nights with relatively low temperature, of higher relative humidity, with a wind velocity of less than 10 km. p. h., and a cloudless sky. There is also some appearance of a connection between the existence of dew and the direction of the wind.

Catch Crops for Cotton Growers.

Alternative Crops for Cotton Belt Farmers. Peanuts and Soy Bean. "The South African Cotton Growers' Journal and Sub Tropical Planter," vol. 3, No. 4, p. 43, Durban, 1926.

The peanut is eminently suitable for use as a catch or rotation crop in cotton areas.

Its uses are:—roasted for human consumption; source of oil for the table, for margarine, for soap; source of nitrogenous cattle cake after extraction; as hay or fed off *in situ*, both practices being common in America; belonging to the leguminosæ as enriching the N. content of the soil.

Climate.—Absence of frost essential during growing season of from four to six months, according to variety. Ideal is plenty of sun and heat, together with rainfall of about 15 inches, and dry period during harvesting.

Soil.—Ideal is sandy loam containing lime and organic matter. Prohibitive is badly-drained soil apt to cake.

Seeding.—Depth 3 inches, 30-35 lb. shelled or 40-45 lb. unshelled seed per acre. Seed bed carefully prepared. Planting in South Africa in October or November.

Fertilizers.—Phosphatics useful, say equivalent of 200 lb. supers per acre.

Spacing.—Determined by trial ranging from 18 inches to 36 inches between rows and 5 inches to 12 inches between plants.

Harvesting.—By hand or light plough.

Yield.—Average of fifteen bags of unshelled nuts per acre (one bag containing 70 to 80 lb.).

The Soy Bean is also used with success as a catch crop.

It is hardy and given warmth can withstand a considerable degree of drought or wetness. It is practically disease resistant.

It is an excellent soil renovator. Can be used for hay when cut soon enough or the beans collected and used in many ways as a highly digestible form of concentrated foodstuff. Growing period about 100 days.

Men, Trees, and an Idea.

ALLEN, E. T. "American Forests and Forest Life," vol. XXXII., No. 393, pp. 529-532. Washington, 1927.

In 1906 a handful of lumbermen in Idaho formed a forest fire protection organisation on the principle of co-operation between private owners, the various States, and the Federal Government.

The original idea was to form a properly equipped organisation supported by *pro rata* acreage assessment. Four such were formed, and immediately afterwards legislation enabled the State to join with its forested grant lands on a similar basis. Both the public and the forest owners at once began to show confidence in a movement which combined business competence with State authority.

Washington followed suit with a similar association, and in 1909 these five pioneer oragnisations formed the Western Forestry and Conservation Association, to extend the movement through the five Pacific Coast States, and to afford clearing-house facilities for associations, State forestry departments, and the United States Forest Service.

The five associations grew to thirty, stretching from California to Montana, all in the closest co-operation with State and Government forest departments. Generally, men and money were pooled and legislation was promoted to forward this. Compulsory patrol laws were passed in several States. The Federal Weeks law funds were put at the disposal of the co-operative system in Oregon and Washington, with the consequence that in other States the annual appropriation for this purpose became greater each year. As a natural result in each coast State separately, and for the five jointly through the central alliance, nearly every detail of forest protection was settled by conference of all three agencies—*i.e.*, the associations, the State forestry departments, and the Federal Government, represented by experts and by joint permanent committees working all the year. These conferences dealt with subjects of common interest such as—Safeguarding logging methods, slash disposal, trail and telephone building, possible use of wireless and aeroplanes, fire weather forecasts, standardisation of reports and wages, lookout and signal systems, publicity devices, and forest legislation.

British Columbia adopted the system. Eastern Canada was too far away, but as in New England and elswhere, timber owners in Quebec borrowed the idea and put millions of acres under similar protection.

One of the first steps of the Pacific Coast organisation was to develop modern publicity devices for educating the public in fire prevention. Fire prevention technique and equipment were developed by joint committees and covered by field manuals used by all forces. Fire weather forecasting was perfected by the co-operation of Canadian and American meteorological officials. Co-operative agreement made aeroplane assistance from the War Department possible.

Naturally, in course of time, such a scheme began to embrace all forestry subjects, silvicultural and economic. The forestry schools entered into the scheme. A joint forest policy committee pledged association, State, and Federal forest agencies not to promote independently any step that involved the others without discussion and an attempt at agreement.

The present co-operative protective system is financed as follows:—The lumbermen pay 71 to 74 per cent., the States 19 per cent., and the Federal Government 7 to 10 per cent. The range given is seasonal, and in bad years the lumbermen are sometimes obliged to increase their quota. But the public is the chief beneficiary in the end, and it is agreed that a fair distribution of expenditure would be half private, quarter State, and quarter Federal.

The same idea is extended to technical and economic affairs. The Western Forestry and Conservation Association maintains a research department to aid at actual cost owners wishing to investigate forestry possibilities. This work is performed in complete co-operation between the various forestry organisations—State, Federal, and private. There is a thorough interchange of ideas and devices. The Pacific Coast system has been increasingly recognised as a possible solution of the difficulty of uniting forestry interests in a common cause. The system was approved by the Senate committee on reafforestation, and in the form of the Clarke-McNary law is now the accepted national forest policy.

Twenty years' experience sees the Pacific Coast scheme becoming ever more successful. Deforested lands are being reafforested, old theories are falling before wider study and joint analysis, old controversies appear puerile in the light of actual experiment where methods are fitted to varying actual conditions. The result is both trees and men.

TANNING MARSUPIAL AND OTHER SKINS.

We have received numerous letters asking for instructions in curing and tanning these and other skins. The following recipes should prove satisfactory:—

The general principle is to trim off the useless parts of the skins and remove all fat from the inside. Soak the skins in warm water for about an hour; then apply a coating of borax, saltpetre, and Glauber's salts, 1 oz. of each, dissolved in sufficient water to make a thin paste. On the following day give a coating of a mixture of 1 oz. of sal. soda, ½ oz. of borax, and 2 oz. of hard soap. This latter mixture should be slightly heated without allowing it to boil. After this, fold the skin together and leave in a warm place for twenty-four hours. Then take 4 oz. of alum, 3 oz. salt, and 2 oz. of saleratus; dissolve these in hot water, and when cool soak the skin in it for twelve hours. Wring out, and hang up to dry. If you find the skin not sufficiently soft, repeat the soaking and drying two or three times.

Another method is, first to remove the flesh and fat. Then wash the skin in a solution of sal. soda and water. Take 4 oz. of powdered alum, 8 oz. of salt, 1 quart of new milk to 4 gallons of salt water, and 1 pint of prepared starch. Stir well, and then put in your fur skins. Air them often by hanging them over a stick laid across your tan tub. Handle them occasionally until they have been in the liquor for a day or two. Then remove the skins and add to your liquor a half teaspoonful of sulphuric acid. Stir this well into the liquor. Put the skins back and steam them well for about an hour. Then take them out and wring, and rinse off in soft lukewarm water, and hang them up in a cool place. When they begin to get white, work and stretch them till they are dry.

Hides of larger animals, such as kangaroos, calves, &c., should remain longer in the solution.

To cure a tough skin, trim it on the flesh side with a sharp knife and then well brush with a solution of 2½ lb. of alum and 1 lb. of common salt in 1 gallon of warm water. The skin should be treated two or three times with this solution on successive days. Now sprinkle bran all over the skin, brush out, and nail the skin to a board to dry.

Note that each kind of skin requires some special treatment—that is, all skins cannot be tanned in the same manner, but the general principle is the same as above.

Still another method is by what is known as "the lightning tanning process," which is said to be the quickest method of tanning wallaby, rabbit, and other skins, and is very simple. It is as follows:—Pour 5 or 6 quarts of boiling water over 2 quarts of bran, and then strain the infusion. Make an equal quantity of salt water, by adding to blood-warm water as much salt as it will dissolve. Mix the bran and salt water, and to each gallon of the mixture (when no more than lukewarm) add 1 oz. of sulphuric acid (H_2SO^4). Immerse the skins in the liquor, stirring them occasionally until tanned, which will be in about twenty minutes. When tanned, rinse in clean water and hang out in a shady place to dry. Pull and stretch them well while drying. By sufficient pulling they can be made quite white. Dry skins should be soaked in warm water before tanning till they are quite soft and white.

GOOD ROADS AND RURAL DEVELOPMENT.

MOTOR VEHICLES AS FEEDERS TO THE RAILWAYS.

CLOSER CONTACT BETWEEN CITY AND FARM.

By J. H. GILBERT.*

Before the development of the petrol-driven motor and its application as the motive power of self-propelled vehicles over road surfaces the quality of the roads was not a matter of great interest. Steam and, later, electricity were being used in the transport of goods and passengers on rail racks. The slow-moving horse traffic was allowed to get along as best it could, and, although there were roads throughout the country, the money expended in their construction and upkeep was more or less begrudged by the average taxpayer.

Now that the roads are used principally by an ever-increasing number of motor vehicles, however, it is a different matter. People can now move along the highways and transport their goods at a rate of speed that rivals that of the steam and electric railways, but they want to do it in comfort, and on a smooth surface. The ordinary roads of the State are not only rough but dangerous to fast-moving traffic, and the wear and tear on the vehicle is very great.

The motor-car and motor-truck have demonstrated the fact that fast-moving vehicles travelling in every direction throughout the country districts are the means by which much of the country's produce is brought to the rails and thence to the seaboard. They are also a great factor in the distribution of the imports and food products to the people, even under the present bad state of the roads. When the condition of the highways is made good, there will be greater progress industrially and socially, and a greater impulse will be given to agriculture.

Although it is only fair that the general taxpayer should contribute to road improvement, as he will benefit by the increased prosperity of the State, the users of the roads should be the principal contributors by special taxation, such as license or fuel taxes.

Mr. Frank Page, chairman of the State Highway Commission of North Carolina, in "Public Roads" (a journal published by the United States Department of Agriculture), dealing with the wonderful development of the State of North Carolina during the last five years—since it has had the benefit of good roads throughout the State—the population of which is comparable with that of New South Wales, says:—

"£25,000,000 has been expended in highways since 1919, most of it since 1921, when we issued £10,000,000 in bonds, and later £7,000,000 more to build a State system of highways. The volume of shipments by rail has increased 20 per cent. since 1923 despite the fact that a big part of short-haul freight formerly handled by the railroad now goes by trucks. Tourists have been attracted. Hotels have sprung up and the farmers of the surrounding country are growing truck produce to feed them. Unquestionably the passenger car and improved highways have greatly stimulated the travelling habit.

---

* In the "Farmer and Settler."

"Just as the State reached a point of progress that attracted capital to project electric interurban lines, the motor-car came into prominence, followed by the demand for road improvement. Many of the branch steam lines and short-line steam railroads have served their purpose. People seem to prefer to travel on the highways in their own cars and to use their own trucks. It is time we recognised this and educated public opinion to the economic waste in forcing these lines to continue operations at a loss when the same public, after voting to force continued operations, refuses to patronise the roads. The public must choose which type of transportation it wants, and if the choice favours the highway there must be a closer co-ordination of rail and highway service.

"New fields of industry and agriculture are being opened, and the old fields are being stimulated immeasurably by the highway. It goes without saying that all this assures to the rail carriers much business and proportionate prosperity. We have increased our farms by 13,000, built schools to the value of £7,000,000. To these schools each day are brought 100,000 pupils in 2,000 school 'buses covering 40,000 miles. We have developed marketing associations engaged in shipping car-loads of poultry, eggs, hogs, fruit, and vegetables, that formerly we did not grow for outside sale. We have opened up parts of the State formerly foreign so far as transportation connections were concerned. The true value of property has multiplied eight times since 1900. We have built our State system and are maintaining it entirely at the expense of the road-users. The bonds are retired through a sinking fund maintained entirely by the motor taxes."

Commenting upon the same subject, Mr. William A. Graham, State Commissioner of Agriculture, says:—"The good roads in this part of the State have made it possible to supply the manufacturing cities from farms situated as much as forty miles away or farther. Before the advent of good roads the farmer that lived as much as 10 miles from town rarely took produce to market unless his roads were in what he would call prime condition, and then it took him an entire day to make the trip. The town was then forced to get its supplies from sources outside the State, as it could hardly draw on more than 75 square miles of territory for local production. With the coming of good roads the market gardens of the cities have grown from an area of 50 or 75 square miles to 1,000 to 1,200 square miles or more. Here we find diversified farming—cotton, corn, tobacco, potatoes, wheat, oats, and vegetables—all growing on the same farm the same year.

"New markets for farm produce have been created. Not the least of the advantages of these markets has been the social contact between the city and farm. Each has learned what the other is doing. The farm women use the receipts from their produce sales to buy conveniences for the farm home—clothing, books—everything they have wanted but could not get before for lack of funds. Incidentally, all these purchases make increased business for the railroads, waterways, and highways. The smaller cities in particular have felt the impulse to grow, called for by the improving of the highways connecting them with more prosperous cities. Now nearly all of them have new hotels, new business houses, municipal office buildings, paved streets, and better homes."

In Australia during the last few years, and especially during the last twelve months, the effectiveness of motor transportation in rapidly handling the harvest of wheat and wool under the adverse condition of bad roads has shown that it is possible to extend the wheat area very considerably beyond the present limits to which it is confined owing to distance from rail. If good roads be provided there is no reason that Australia's wheat production should not be doubled within the next decade. Money to build these roads should be readily obtainable, the more especially now that older countries have shown what motor traction has done for them in multiplying the country's activities in every direction, in rapidly adding to the value of its assets, and in greatly increasing the volume of traffic on the railways. An increase in traffic on the railways of 20 per cent. would make them pay.

It is a Federal matter. It has been taken in hand by the Commonwealth Government, and it is to be hoped that the work already begun will be pushed on with the greatest despatch.

We have a very extensive country to open up, but considering that at least the interest on the capital expended can be obtained from those that use the roads, there should be no hesitation in launching out on a big scheme of road construction. The amount of taxation that may be imposed upon the road-users will be more than made up by the increased life of their vehicles and the great saving effected in their upkeep.

THE INFLUENCE OF ACIDITY ON THE QUALITY OF BUTTER.

By C. McGRATH, Supervisor of Dairying.*

The earliest methods adopted in the manufacture of butter gave rise to conditions that ensured the ripening of the cream before manufacture. The setting of milk and hand skimming ensured the souring of cream before manufacture. The introduction of the cream separator and its use on the dairy farm was responsible for a rapid expansion of the dairy industry and the establishment of large central butter factories. The greater portion of the cream produced is delivered to the manufacturing centres in a more or less ripened condition. The consumers' palates from the earliest dairying period became accustomed to and appreciated the flavour of butter the product of high-acid cream.

In modern dairy practice the ripening of the cream and its influence on the immediate flavour of the product is well understood. Modern scientific research into the process of butter-making has demonstrated that the acid content of cream profoundly affects the keeping quality as well as the flavour of the butter produced therefrom.

Owing to the rapid expansion of the dairy industry the Australian markets were supplied and a rapidly increasing surplus of butter was available for export to oversea markets. In order to produce a butter that could compete in the world's markets, it was necessary that the process of manufacture must be on scientific lines, and this period marked the beginning of the science of butter-making.

The manufacturers and consumers were familiar with the important influence of acidity on the flavour of the butter, while scientific research yielded the knowledge that the acidity in the cream and butter greatly influenced the durability of the product.

Butter that does not possess keeping qualities and whose flavour changes rapidly or is not generally uniform in character is not suitable for export.

The marketing of our butter overseas and cold storage demanded a special characteristic—viz., keeping quality. The economic and hygienic benefits secured by submitting cream to a process of pasteurisation before manufacture became obvious. Butter, the product of unpasteurised fresh sweet cream, was found to be lacking in durability.

The separation of cream on the farm and its manufacture in large central factories is responsible for a portion of the cream supply being in a high acid condition on delivery at the factory.

If sour cream is submitted to pasteurising temperatures it frequently curdles or becomes ropey, and when churned fine particles of curd adhere to the butter granules and remain after washing, producing a butter with a high curd content and lacking in keeping quality, while the loss of butter-fat in the churning process is as high as 2 or 3 per cent.

The butter, product of cream pasteurised in a high acid condition, frequently obtains a scorched flavour and lacks storing quality.

In order to realise the benefits of pasteurisation it is necessary to reduce the acidity of the cream to a desired standard by the addition of an alkali. The neutralisers in general use are bicarbonate of soda (baking soda) (bicarbonate appeals owing to its being readily soluble and easily made up into solutions of desired strength) and lime hydrate (calcium hydrate) which is used in two forms—lime water or milk of lime. Lime water is very weak, and its neutralising power so slight that it is not so suitable as milk of lime as a neutraliser of cream. Lime is a suitable alkali for use. It is a natural constituent of milk. Milk contains slightly more calcium volume than does lime water, and should a small quantity of added lime enter into the composition of the butter it would not lessen its food value or healthfulness, and does not abstract any constituent of the cream or butter.

Correct neutralisation of cream by reducing acidity makes possible its pasteurisation without obtaining scorched flavours, ensures against excessive loss of fat in churning, and improves the keeping quality of the butter.

Neutralisation will not enable a factory management to make good butter from a low-grade cream. Poor cream always produces a poor low-grade product. Careful attention and accuracy is necessary in reducing the acidity of the cream in order to ensure the benefits of the process. The quality of cream must be definitely ascertained and the cream must be thoroughly mixed and a sample representative of the whole taken. The test must be correctly carried out and the alkali weighed or measured, and be completely dissolved and thoroughly stirred into the cream. The effect of time and temperature on the neutralising action of the alkali must be considered. The partial neutralisation of sour cream permits of the pasteurisation process as used with sweet cream to be successfully applied.

---

* From an address delivered at the Annual Conference of the Queensland Butter and Cheese Factory Managers' Association, at Brisbane, 14th June, 1927.

Such processing, however, will not make a clean-flavoured sound-keeping butter from cream which is stale, fermented, rancid, or which has such defects as strong feed flavours, unclean, milking machine, or off flavours of a similar character.

Pasteurisation.

Proper methods of pasteurisation of cream ensure the destruction of the great majority of bacteria and other ferments contained in the cream. Pasteurisation will not make possible the production of a first-grade butter from low-grade cream, but it will improve the flavour and keeping properties of the butter, ensure more uniformity in flavour and quality, and make for the protection of the health of the consumer by the destruction of germs of human and animal diseases, and increases efficiency in the industry.

The reduction of the acid in cream and pasteurising process assist greatly in the production of a mild-flavoured butter of low acidity. Manufacturing conditions influence the amount of acidity in butter. Even though the right amount of acid is present in the cream at the time of churning the acidity of the butter may be too high if the cream be churned at a high temperature, or the butter is overchurned, or if the butter granules are not properly washed.

The serum of the cream is the main source of its acidity. If the acidity of butter is tested without a fat solvent like alcohol and ether, the acidity measured is practically all due to butter-milk.

Thorough removal of the butter-milk from the butter granules is necessary in order to produce a sweet butter possessing keeping character.

The process of churning results in the separation of the butter-fat from the caseous and serous parts of the cream in the form of butter granules. Under modern methods of manufacture the size of the butter granules can be controlled.

The butter-maker realises the importance of the correct size and uniformity of butter granules and the relation thereof to the quality and character of the finished product. In the process of churning, the small butter granules unite to form larger granules, and the churn is stopped when the granules are of the size desired. The spaces between the small granules that form the larger granules are filled with butter-milk. If the butter is overchurned the surface of the large granules is compressed to a greater extent than the surface of the smaller granules, and the removal of the butter-milk is difficult.

The wash water has a greater distance to travel and cannot pass as readily and as quickly through an oversize granule as through a granule of the size of a small grain of wheat. The smaller the granule the more complete is the removal of the butter-milk. If the granules are too undersized a loss is occasioned by their escaping through the strainers. A butter mass composed of very small granules drains very slowly.

If the churning ceases when the butter granules are very small, it is advisable to let the churn rest undisturbed for some ten minutes to give the smaller granules an opportunity to rise to the surface and adhere to the butter grains.

Washing.

Thorough washing of the butter granules in the churn has an important influence on the character and keeping quality of the butter. When the butter granules are the desired size, the churn should not be revolved unless the granules are floating on the butter-milk or wash water. If this precaution is not observed the mass of butter granules will fall with such impact as to become pressed together in a mass and the butter-milk will be sealed in the granules.

When the flow of butter-milk from the draining cock has almost ceased and the butter granules have settled to the bottom, the mass of granules should be sprayed with cold wash water.

When the drainings from the open taps become watery the taps should be closed and the necessary amount of wash water added, when the churn should be given a few turns in slow gear. This wash water should be run off and another quantity of wash water added, and the churn again given a few revolutions in slow gear. This water in turn should be run off, and the working and salting of the butter proceeded with. It is necessary to wash the butter granules free from butter-milk, as the greater portion of the lactic acid and the majority of undesirable flavours are in the butter-milk. Careful washing of the butter granules assists in reducing acidity and off flavours and improves the character and keeping qualities of the butter.

Choice butter possessing keeping quality is the product of choice cream, correctly pasteurised and manufactured under conditions that allow of the removal of the butter-milk, and the proper working of the butter ensuring the desired body texture and condition.

NON-SETTING OF FRUIT—LESSONS TO BE LEARNED.

Non-setting of fruit has troubled orchardists generally during the present season, and explanations of the failure have been given some prominence. A typical instance of poor setting (of apples and pears) was investigated in the latter part of 1926 on behalf of members of the Batlow packing-house and the Batlow branch of the Agricultural Bureau. Thrips seemed to be the main cause of the condition in some fruits, but it was accentuated by: (1) Unfavourable climatic conditions during the blossoming period; (2) weakness of the blossom buds caused by the dry spell last January and February; and (3) carelessness in cultivation.

Conserve Soil Moisture.

A very dry spell was experienced last season, and consequently (and especially in cases where a grower had been careless in cultural work) the vitality of trees, especially of those carrying fruit, was adversely affected. Insufficient or neglected cultivation results in greater loss of soil moisture, which lowers the vitality of the tree, a condition that is reflected in weakness of the blossoms.

Trees which carried no fruit last year, and as a consequence bore a lessened strain upon their vitality, and also trees whose owners pursued sound cultural methods and thereby conserved sufficient soil moisture, set fair crops. Weak blossom buds take longer to develop than strong buds, and as a consequence the thrip has a longer period during which to carry on its destructive work; a strong blossom bud opens more quickly than a weak one, and fertilisation has more chance of taking place before serious damage is done to the organs of reproduction.

Combat Thrips.

Unfavourable weather conditions often retard the opening of blossoms, and in such cases also the thrip has a longer period during which to carry out its depredations. Frosts injure the essential organs of reproduction and prevent fertilisation, and also destroy young fruit after fertilisation has taken place. Cold winds and excessive rains greatly interfere with the activity of the bees, with consequently poor settings, and weak blossoms often fail to set fruit, no matter how favourable the conditions may be. There certainly was a combination of adverse factors at work at Batlow, but the predominant factor was thrips.

There is no doubt that here, as well as in other districts, insufficient attention has been paid by a number of growers to conservation of soil moisture and the maintenance of soil fertility. Good results can only be obtained by good cultural work, and by improving the physical condition of the soil by ploughing in suitable green crops. Such treatment would, of course, react favourably upon the trees and upon their crops.—"A. and P. Notes," N.S.W. Department of Agriculture.

"A VALUABLE JOURNAL."

A Mount Larcom farmer writes (23*rd May*, 1927): *"Am a constant reader of the 'Queensland Agricultural Journal' and must congratulate your Department on the very high standard the Journal has attained. It is indeed of great value to me, and I cannot understand why it should need any advertising to get the farmers to take advantage of your very generous offer to forward the Journal for the cost of postage."*

FARM TRACTORS—ENGINE EFFICIENCY.

By E. T. BROWN.*

The capacity for work of a tractor is stated in terms of "horse-power." If your outfit is not giving of its best you can reckon that some of the "horses" are dead. It is not my intention to discuss the question of the value of the unit which has been determined upon to denote the power of a tractor engine. That there are arguments for and against the horse-power unit is apparent to all, but I am not concerned with that side of the problem. I am, however, concerned with the question of the power derived from the engine. Every make of tractor is stated to be of a given power. It may be that the tractor you own or which you are operating is designed to give 20 horse-power at the belt pulley and 10 horse-power at the drawbar. Such an outfit is termed a 10-20 horse-power tractor. There is no question that such a machine can develop the power that is claimed for it by the makers. But it can only develop such power if the engine be properly adjusted and tuned. If it be otherwise you can take it that some of the horses are dead.

Tuning up.

It is nothing unusual for the motor cyclist or motorist to spend hours on end tuning up his machine. As a general rule, however, the object in this case is to secure a little extra speed. The object in keeping a tractor engine keyed up to the highest degree of efficiency is that more power at the drawbar may be available for work. An engine that is in perfect working order will develop more power than one that needs adjustment, and, moreover, the additional power is secured with a smaller consumption of fuel and oil. In this day of ever-increasing costs any saving effected, especially when combined with increased power, is a point for which one should strive.

What Kills the "Horses"?

There is a number of ways in which the efficiency of an engine can be reduced. The causes are simple in themselves, but they exert an influence greater than would be expected. They are simple causes; it is usually simple to correct them. In the first place, it may be the fuel supply that is at fault. The presence of dirt in the fuel pipes may cause a partial stoppage, with the direct result that the feed is intermittent. Again, the fuel valve may not be properly adjusted, in which case the quantity of fuel supplied is either too little or too much. Secondly, the engine may be over-heated. This may be due to a variety of causes, but, as a general rule, it will be found that the water circulation in the cooling system is imperfect. The use of dirty water, and after a time the use of hard water tends to clog up the tubes of the radiator and the water jackets.

Thirdly, the ignition may be at the root of the trouble. The spark gap may be too great on the sparking plug or it may be too small; the plugs may be dirty or faulty; the primary terminal of the magneto may be dirty; or the spark may be set too late, or it may be weak. Fourthly, it may be that the engine is not receiving sufficient oil, or that a wrong grade of oil is being employed. The greatest care must be exercised in the selection of a lubricating oil that is specially adapted for the type of machine in use. Lastly, the compression may be poor. Low compression is generally due to one of the following causes:—Accumulation of carbon deposit under the valves; incorrect adjustment of the tappets; sticky valve stems; bent valve stems; and dirty or broken piston rings.

Keep all the "Horses" Alive.

The various causes that have been suggested as making for an inefficient outfit can very well be done away with. It is quite within the knowledge and skill of the average tractor operator to tune up his engine in such a way that every "horse" is kept not only alive but vitally active. By a slight adjustment here, or the removal of a little dirt there, or the use of a better, higher-grade lubricating oil, the efficiency of the engine may be increased enormously. It lies in the hands of the operator whether the engine delivers power to its full capacity or not. If otherwise, it means that the operator and not the engine is to blame. Learn the individual characteristics of your outfit and humour any special traits that it may possess by tuning up according to its own peculiar needs. In this way, and in this way only, can you make sure that none of the "horses" are dead.

---

* In the "Farmer and Settler."

SNAILS AS AN ORCHARD PEST—CONTROL MEASURES.

Snails are well known as enemies of the vegetable and flower gardens, but they showed up recently at Gosford (N.S.W.) as a pest of citrus fruits. Holes were eaten in the oranges just colouring, and a fair quantity of fruit fell from the trees. Navels suffered to the greatest extent. The foliage was also attacked by the snails in some cases.

Though snails have been known to damage fruit trees on other occasions, such happenings are rare, and, in the most recent case, was associated with very heavy weed growth following excessive rains.

Investigations made in the affected district showed the grass and the weeds literally alive with snails, and for that reason the Department of Agriculture (N.S.W.) does not advise orchardists to cultivate at this stage, as the deprivation of natural food would cause the snails to migrate in even greater numbers to the citrus trees. Clean cultivation earlier in the season would have prevented the damage to a very large extent.

In dealing with the snail nuisance the removal of adjacent weed growth is absolutely essential prior to control measures being undertaken. However, it is again stressed that it is very exceptional for snails to attack fruit trees, and such attacks can be guarded against by clean cultivation, which means an absence of weeds.

Should the snails get ahead of the orchardist, one or other of the following measures for control can be recommended:—

While in a small area the snails may be collected by hand and destroyed, but when in a larger area and in large numbers the snails are best controlled by spraying or dusting, or by the use of poisoned baits. A poisoned bait consisting of 1 lb. calcium arsenate or Paris green and 16 lb. bran is recommended. It is essential that the Paris green should be thoroughly stirred dry with the bran until the whole is thoroughly mixed. Sufficient water is then added to make a damp crumbly mash. This bait is scattered in a thin layer on the soil along the rows of affected plants and other situations where the snails congregate. The bait should be applied late in the afternoon or at night to ensure its being moist, as it is useless in a dry condition. This bait proves effective, but may not kill the snails in appreciable numbers for two or three days.

Another method is to spray with arsenate of lead powder, 1½ lb. to 40 gallons of water, or arsenate of lead paste, 3 lb. to 40 gallons of water.

Mr. H. Fagan, of Lisarow, one of the growers whose trees were damaged by snails, obtained good results by using lead arsenate powder at the rate of 2 lb. to 50 gallons of water. Later he increased the strength to 3 lb. to 60 gallons, to which he added 6 lb. sugar, in the belief that the sugar would make the mixture more attractive. Results greatly favoured the mixture containing the sugar, and the Department of Agriculture is now investigating the value, if any, of sugar in stomach poison sprays for combating snails.

Dusting with 1 lb. arsenate of lead powder diluted with 4 lb. hydrated or slacked lime dust, finely sieved, can be recommended.

Boards set out at intervals and baited beneath with portions of boiled potato form attractive traps, where the snails will congregate and shelter by day, and can be destroyed in numbers.—"A. and P. Notes," N.S.W. Department of Agriculture.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Answers to Correspondents.

The subjoined replies are from a very large number posted from the Department to correspondents in the course of the month, and are selected because of their general interest. All inquiries should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Maize as Cattle Fodder.

R.B. (Eidsvold)—

Your inquiry if maize is a good thing to fatten bulls or bullocks was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—Corn is undoubtedly the best fattening feed for cattle, but is rather low in protein, and therefore if the other feed does not contain a sufficient amount of protein, a loss will take place with waste of corn. It is best for fattening cattle to supplement the corn with legume hay in order to produce quick fattening. With very hard flinty grain, fed to horses, some may pass undigested, but this should never happen with cattle.

Soil Formation.

"CAMARA" (Barcaldine)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises that soil is originally formed by the gradual crumbling up of rock by the action of weathering, induced by the alternate and combined action of air, rain, frost, and heat. Further changes take place by the processes of bacterial, plant, and animal life. Rocks are generally built up from a variety of minerals, which decompose in various ways, some forming soluble compounds, which are gradually washed out. Soils may remain in the place where they were formed or may be transported by wind and water. The same class of rock may produce various classes of soil according to locality and seasons. Most of the rocks contain only small amounts of phosphoric acid, and, therefore, many of our soils are deficient in phosphoric acid, which is of particular importance to produce nutritious pastures. Soils produced from granite rocks and sandstone are generally more deficient in phosphoric acid than soils formed from basaltic rocks.

Corn-Cob Meal.

INQUIRER (Gayndah)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises:—Although the feeding value of ground corn cobs is very small as compared with shelled corn, actual experiments with horses have proved that corn-cob meal is as valuable as an equal amount of shelled corn, because the corn-cob meal aids in the digestion and prevents waste of corn passing through undigested.

——	Digest Protein.	Digest Carbohydrates.	Digest Fibre.	Starch Value.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Shelled corn contains ..	6·7	65·8	1·8	80·8
Corn-cob meal	0·5	26·8	18·3	23·1

To every 56 lb. of shelled corn give about 14 lb. of cob. According to variety of corn the weight of cob is from 20 to 40 per cent. of the grain, flint varieties having larger proportion of cob to grain than the dent corn.

Soil and Arsenate of Lead.

D.G.M. (Wellington Point)—

Your inquiry as to what effect, if any, the continuous application of arsenate of lead has on the soil, was referred to Mr. J. C. Brünnich, Agricultural Chemist, who advises:—Application of arsenate of lead will have no effect on the soil, as it is quite insoluble. There is no danger in handling the lead arsenate to persons; only actually eating and inhaling large amounts of the arsenate would be dangerous. Ordinary cleanliness, like washing hands before meals, needs to be observed by users.

BOTANY.

The following are selected from the heavy outward mail of Mr. C. T. White, F.L.S., Government Botanist:—

"Jack Bean."

W.M. (Nanango)—

The bean forwarded is *Canavalia ensiformis*, the Jack Bean. The beans can be used in the very young state as ordinary French beans, or the nearly ripe seeds cooked as Broad Beans or Lima Beans. As the beans do not apparently agree with all stomachs, it is as well to try them in a small way first. Personally we have eaten them a good deal and found then excellent, and trouble where reported has arisen we think through using the beans when too old and indigestible.

Khaki Weed.

W.R. (Kawl Kawl, Proston Line)—

The specimen is *Alternanthera Achyrantha*, the Khaki Weed. It is one of the worst weeds we have and should be eradicated immediately if possible when it makes its appearance in a district.

Suspected Poison Plant.

INQUIRER (Dalby)—

The specimen sent by Inspector McCarthy as suspected of poisoning a number of sheep at The Gums, Tara, is *Zygophyllum apiculatum*, a very common plant in Queensland but one for which I have not heard a local name. It is very drought-resistant and during very long droughts vivid green bushes of this plant are to be found in some places in great abundance. It is, however, rarely touched by stock. It has been suspected of causing losses, but, in the absence of feeding tests and chemical work, nothing very definite is known on this point.

Needle Burr, a Bad Pest.

INQUIRER (Kilkivan)—

Your specimen is not a hybrid between Cockscomb and Khaki Weed, but a natural species—viz., *Amarantus spinosus*, the Needle Burr. This plant is a very bad pest in some parts of North Queensland and we have seen occasional plants in the South. Finding a suitable environment, it is apt to become a bad pest but is nothing like so noxious as Khaki Weed.

"Gooseberry Cucumber" or "Paddy Melon."

H.P. (Ellinthorp)—

The specimens of fruits are those of *Cucumis myriocarpus*, the Gooseberry Cucumber or Paddy Melon. It contains the poisonous principle "myriocarpin." Stock eating it may become affected with partial blindness and paralysis. On the other hand, stock frequently eat large quantities without apparently any ill-effects following. In view of the possible danger it is as well to keep valuable stock off the plant.

Grasses Identified.

R.D. (Chinchilla)— Grasses have been identified as follows:—

1. *Aristida calycina.* A 3-pronged Spear Grass.
2. *Triraphis mollis.* Purple Heads.
3. *Tricholaena Teneriffae.* Red Natal Grass.
4. *Andropogon refractus.* Barbed-wire Grass.
5. *Aristida vagans.* A 3-pronged Spear Grass.
6. *Andropogon pertusus.* Pitted Blue Grass.
7. *Chloris Gayana.* Rhodes Grass.
8. *Bromus unioloides.* Prairie Grass.
9. *Eleusine aegyptiaca.* Button Grass.
10. *Eragrostis Brownii.* Love Grass.
11. *Sporobolus indicus* var. *elongatus.* Rats' Tail Grass.
12. *Setaria glauca.* Pigeon Grass.
13. *Phalaris canariensis.* Canary Grass.
14. *Stipa micrantha.* Bamboo Grass.
15. *Pappophorum nigricans.* "White Heads."
16. *Heteropogon contortus.*
17. *Arundinella nepalensis.*
18. *Paspalum dilatatum.* Paspalum Grass.
19. *Panicum distachyum.*
20. *Panicum didactylum.* Blue Couch.
21. *Eragrostis Brownii* variety. Love Grass. A rather different form to No. 10. It is a variable grass with a number of different forms or varieties.
22. *Tragus racemosus.* Small Burr Grass.
23. *Chloris acicularis.* Star Grass.
24. *Perotis rara.* Comet Grass.
25. *Setaria aurea.* Pigeon Grass.
26. *Pollinia fulva.* Brown Top.
27. *Eriochloa punctata.*
28. *Fimbristylis diphylla.* A sedge; not a true grass. See note under No. 31.
29. *Fimbristylis barbata.* A sedge; not a true grass.
30. *Diplachne parviflora.*
31. *Cyperus rotundus.* Nut Grass. This is a sedge, not a true grass; the sedges are grass-like plants, for the most part growing in damp places; some are eaten by stock, but on the whole have not the nutritive value of the true grasses.
32. *Andropogon bombycinus.* Cotton Grass.
33. *Anthistiria ciliata.* Kangaroo Grass.
34. *Gahnia aspera.* A sedge; not a true grass.
35. *Panicum foliosum.* Leafy Panic Grass.
36. *Xerates leucocephala.* Not a grass, but a rather anomalous member of the Lily family.
37. *Panicum leucophaeum.*
38. *Eriochloa punctata.* Same as 27.
39. *Panicum sanguinale.* Summer Grass.
40. *Chrysopogon parviflorus.* Scented Top.
41. *Panicum prolutum.* Coolah Grass.
42. *Panicum trachyrachis.* Coolibah Grass.
43. *Cyperus exaltatus.* A sedge.
44. *Chrysopogon gryllus.*
45. *Danthonia pallida.*
46. *Chloris virgata.*
47. *Pennisetum clandestinum.* Kikuyu Grass.
48. *Phragmites communis.* The Common Reed.
49. *Pennisetum purpureum.* Elephant Grass or Napier's Fodder.
50. *Panicum crus-galli.* Wild Millet.

"Potato Bush."

INQUIRER (Brisbane)—

The specimen from the farm at Purga, *viâ* Ipswich, is *Solanum ellipticum*, a species of "Potato Bush." This plant has several times been suspected of causing losses among sheep though nothing definite has been proved against it. The green berries of most of these plants, however, are dangerous, as most of them contain varying quantities of the poisonous alkaloid—solamine.

The Woods of Albizzia and Pithecolobium.

INQUIRER (Brisbane)—

There seems no doubt that the leaves are correctly matched with the wood specimens of the Yellow Siris. They seem to represent a species of Pithecolobium rather than Albizzia but cannot be matched with any of our material, and they probably represent an undescribed species. We would therefore be glad of complete specimens when available. The woods of species of Albizzia, Pithecolobium, and Archidendron are probably very similar. Baron Mueller classed all these plants under one genus Albizzia, but in this he is not followed by most botanists.

Sandalwood.

E.W.B. (Woepen, *via* Cairns)—

The fruits arrived in a very mouldy condition, but we think the specimens represent the Sandalwood (sometimes called Plum-tree Sandalwood)—*Santalum lanceolatum*. It is recorded that the natives eat the fruits, but beyond that we have no knowledge of their edibility. The wood varies a good deal in its scent. The wood of all the Southern trees is quite scentless, but the wood of most of the Northern trees is more or less scented—particularly of the trees round the Gulf and in the Cape York Peninsula. In sending specimens it is always best to dry them flat between sheets of paper for a few days first; they travel better dry than fresh from any distance.

A Pernicious Weed—Other Weeds.

J.A.B. (Amamoor)—The specimens sent proved to be—

1. *Tridax procumbens*. A native of Tropical America. It has been naturalised in North Queensland for some time, and of late has spread to the South. It is a most pernicious weed and should be destroyed wherever it puts in an appearance. We do not know a local name.
2. *Gnaphalium purpureum*. Cud Weed.
3. *Ageratum conyzoides*. This was introduced as a garden plant and forms of it are grown in Southern gardens. In Queensland it has become a common weed and is popularly known as "Billy Goat Weed"; "Blue Top" is also given to it, but this is applied to a number of plants with blue flowers.
4. *Galinsoga parviflora*. Yellow Weed.
5. *Chenopodium carinatum*. A very common weed of cultivation in Queensland. We have not heard a local name for it.
6. *Stellaria media*. Chick Weed.
7. *Richardsonia scabra*. Mexican Clover. This plant has been spoken highly of in America as a fodder, but our experience with it here is simply as a bad weed of cultivation. We have not noticed stock eat it at all, but have once or twice received specimens with the report that stock eat it greedily. It is not, of course, a true clover.
8. *Euphorbia pilulifera*. Asthma Plant. The dried herb used as a tea gives relief to persons suffering with asthma.

ROSE CULTURE.

In regard to the questions raised—

1. What is the best time to prune roses? We should say now.
2. What is the best time to strike cuttings? This can be done from now on during the cooler weather. On the whole it pays, however, to get worked plants, as we do not think the majority of roses do too well in Queensland on their own roots.

PAPAWS.

3. Is there any way you can tell male papaw plants from the females in the young stage? A method we have found fairly satisfactorily is to discard the more robust plants and plant out the smaller ones.

HOYA.

4. Can hoya roots be struck in the ground? Hoya strikes fairly readily in light soil; plants rooted in the ground readily climb up bush-house posts or wherever you wish to grow them.

BORONIA.

5. *Boronia megastigma* and *B. serrulata.*—These as a rule do not do too well in Queensland, the hot wet summer is against them; we think you would have to get plants or seeds from one of the Southern nurserymen. They are not, as a general rule, propagated here.
6. *Thunbergias, Lasiandras,* and *Lagerstroemia* are usually propagated by cuttings of fairly well ripened wood in the spring.

"Mexican Clover."

INQUIRER (Meringa)—The specimens proved to be:—

No. 1. *Richardsonia scabra,* sometimes called "Mexican Clover." It is a native of tropical and subtropical America, but now occurs as a naturalised weed in many countries. In Queensland it is a very common weed along the whole of the coastal belt. In the United States it has been highly spoken of as a fodder, but out experience here is that stock rarely touch it, at least to any extent. It belongs to the family Rubiaceae and is, of course, not a true clover.

No. 2. *Eclipta alba.* Family Compositae.

"Stork's Bill" or "Crow's Foot."

H.C. (Thangool)—

The specimen forwarded is *Erodium cygnorum* or "Stork's Bill," a member of the Geraniaceæ or Geranium family. It is commonly known in many places as "Crowfoot" and is regarded as one of the best of the fodders in herbage country, affording good feed during the winter and spring months. The ripe seeds with their corkscrew-like tails are regarded as somewhat obnoxious in sheep country, but its good qualities outweigh its bad. The plant cut in flower is said to make good hay. In some parts of Southern Queensland and Western New South Wales the plant occurs in great abundance.

FRUIT CULTURE.

Apples in Central Queensland.

J.A. (Yalleroi, C.Q.)—

The Acting Director of Fruit Culture, Mr. Geo. Williams, advises:—The climate of Central Queensland is not adapted for the successful culture of apples. Limited crops only could be obtained, and Hockings' Greening and Carrington would be expected to give best results.

SHEEP AND WOOL.

Selected replies by the Instructor in Sheep and Wool, Mr. W. G. Brown.

Blight in Sheep.

M.E.G. (Roma)—

In regard to your correspondent's question concerning blight in sheep, I have to advise that there are several troubles with sheep's eyes.

1st, Grass Seed: In this case the wool should be clipped around the eyes, and a little castor oil applied.

2nd, Dietary: There are often weeds such a paddy melon vine which causes temporary blindness. The sheep will recover after being taken off the country where paddy melon grows within a fortnight.

3rd: Sometimes ewes heavy in lamb, if disturbed by dogs, &c., have the lambs crossed. A notable symptom of this class of blindness is shown by the animal holding its head in the air, and they are weak across the hindquarters.

4th: There is real blight. This can only be dealt with by the application to the eyes of a solution containing sulphate of zinc—2 parts water, 5 parts sulphate of zinc.

I would be glad to know which of the above causes are operating on your correspondent's sheep. We can advise better then.

Blight in Sheep.

M.E.G. (Roma)—

I note that your correspondent's sheep are suffering from real blight. I consulted Mr. A. H. Cory, M.R.C.V.S., Chief Inspector of Stock, and he advises that the following formula will give relief:—Sulphate of zinc, 20 grains; water, 6 fluid ounces; to be applied with glass syringe once a day.

PIG RAISING.

Selected replies by the Instructor in Pig Raising, Mr. E. J. Shelton.

Pig Feeding.

W.H.F. (Leyburn)—

A ration of sorghum, maize, and lucerne together with some concentrate such as pollard, barley meal, or protein meal, &c., should prove quite satisfactory, with the addition of mineral matter and a good supply of clean drinking water. Under our conditions and our market requirements, we find that to do away with concentrates and mash feedings does not pay, and, in addition to grazing on sorghum, we would suggest that you crush the maize, boil or soak it, and mix it, with some concentrate, into a gruel and feed warm as a morning food; green lucerne and whole maize could be fed for the afternoon food. Charcoal and a piece of rock salt should always be available in the yards or pens so as the pigs have access to it at all times; we do not advise grinding and mixing charcoal with the food. The addition of lime water to the morning food will be found to have very beneficial results. To make lime water, secure a wooden cask, place about half a bucket of lime in the bottom and fill with water; after using each morning refill the cask with water, and so long as a film appears on the surface each morning the lime is still acting; feed in the proportion of about one pint to kerosene tin of feed.

Broom Millet Seed as Pig Feed.

G.F.C. (Dallarnil)—

On looking up the chemical analysis of both maize and broom millet, it is found that there is very little difference between these two grains. Maize contains 9.5 per cent. protein, 69.3 per cent. carbohydrates, and 4 per cent. fat; while broom millet contains 12.6 per cent. protein, 60.8 per cent. carbohydrates, and 4.8 per cent. fat. Maize, of course, can be fed as a dry grain; in fact we recommend this way of feeding maize. While it will not be found to advantage to feed millet other than by boiling or crushing it and mixing with skim milk and pollard or some other concentrate, still it may pay to experiment by feeding, say, three pigs with a mixture of maize and millet boiled and fed with skim milk; three pigs with millet boiled and fed with skim milk; and three pigs with maize alone. Plus green feed and minerals in each case. Should you conduct this experiment we would be pleased to receive any information and results you obtain; but from our present experience of millet grain we would not recommend feeding it other than as stated.

Molasses as Pig Feed.

F.B. (Cooran)—

When molasses is fed to pigs it should only be used as an appetiser and laxative, but if fed in excess may result in the death of the animals. From the information supplied to us we do not consider that the death of your pigs, in the saleyards or truck, was caused by the feeding of molasses, but rather as a result of an overloaded stomach caused by feeding the pigs immediately before they were trucked. This practice has been the cause of death in many cases and is not to be recommended at any time.

General Notes.

Banana Beetle Borer—Control Reward Offered.

Under the Fruit Marketing Organisation Act, Regulation No. 127 was published in the "Government Gazette" of the 23rd April last, authorising the Committee of Direction to offer a reward of £2,500 for an effective scheme of treatment for the control of the Banana Weevil Borer on certain term and conditions. By a further Regulation, No. 131, the reward of £2,500 has been increased to £5,000.

Egg Board Levy.

Regulations have been approved under "The Primary Producers' Organisation and Marketing Act of 1926," providing for the collection of a levy by the Egg Board, at the rate of one-half penny per dozen eggs, delivered to that Board from the 1st July, 1927, to the 31st December, 1928.

An Order in Council has also been approved empowering the Egg Board to give the security to the Commonwealth Bank necessary for financial assistance being given to the Egg Board by that bank.

"Stock Foods and Feeding."

Writing for another copy of Mr. Brünnich's "Stock Foods and Feeding," a Mount Larcom farmer says:—"I had one and it was a very useful book indeed. I consider the information and the tables of food values made that book worth easily ten shillings to anyone who is trying to get the best results from his stock. . . . . I was telling a Jersey stud breeder of this book and as he was preparing his cattle for the show he requested the loan of my copy. . . . I am without that copy too long already so will be much obliged if you would forward another. . ."

Better Farming—Wheat on Downs—Storage of Fodder.

The big improvement in cultural operations in wheat-growing, which has taken place in recent years, very forcibly struck the Instructor in Agriculture in the Southern Division (Mr. A. E. Gibson) on his recent visit to the Darling Downs. On his return Mr. Gibson said that wheat areas were now receiving a measure of careful treatment that must reflect later on in heavier crops, and in the improved condition of the occupiers of those areas. Horses were now being replaced by tractors and other up-to-date machinery. Provision was being made by means of hay-stacks, which in some instances were thatched, as an insurance against periods of lessened production. Not alone in these, but in other directions, was the improvement in methods noticeable throughout the Downs. The improvements, no doubt, were a consequence of experience gained, and of teaching absorbed, over the last ten years, part of which was a drought period. Improvements in farm buildings were also noticeable.

Fodder Storage Practice.

Where forage crops are used for hay, as they frequently are, it is also important to see to it that the hay is well cured before drawing into the barn. If proper curing takes place in the field—where possible, by use of cocks, in which "sweating" takes place—and if every reasonable precaution is taken to ensure the drawing in of hay adequately dried, there is little danger of fire from spontaneous combustion.

Clovers and lucerne, or mixtures containing these, call for special care in this respect, owing to the greater difficulty in drying out sufficiently these crops. Moreover, making hay from these crops by use of cocks preserves the leaf, in which portion of the crop exists 80 per cent. of the protein.

Having gone to the expense and trouble he has in the raising of forage crops, it behoves the farmer to not jeopardise his good efforts by carelessness in curing and storing the hay produced from valuable forage crops.

Too much care in the field cannot be taken, particularly to-day when more legume hay (clovers and lucerne) is produced and when the hay is rushed in from the windrow with the hay-loader—an excellent labour-saving implement, but one which should not be misused by using it to rush in hay of doubtful fitness or of excessive moisture-content to justify storage.

Staff Changes and Appointments.

The following have been appointed Assistants to Cane Testers for the forthcoming sugar season, at the mills set opposite:—Miss S. Riley, Tully; Miss F. Foubister, Proserpine; Miss E. Walsh, Plane Creek; Mr. G. Becker, Marian; Mr. W. J. Mason, Pleystowe; Mr. H. T. Whitcher, Maryborough; Mr. T. P. Brown, Proserpine; Miss E. Brand, Bingera.

The resignation of Mr. D. P. Cox as Inspector of Stock, Urandangie, has been accepted as from the 14th June, 1927, as tendered.

Messrs. C. J. Boast, J. McFie, and R. J. Rollston have been appointed Assistant Inspectors of Cane Testers for the forthcoming sugar season.

Mr. H. Niemeyer has been appointed Chairman of the Broom Millet Board.

Mr. E. J. R. Barke has been appointed Chemist in Charge of the Sugar Experiment Station, South Johnstone.

Downs Wheat Crop—Prospects Encouraging.

The Director of Agriculture (Mr. H. C. Quodling), when asked recently for an opinion on the effect of the recent rainfall on the prospective wheat crop, stated that Mr. C. S. Clydesdale (Assistant Instructor in Agriculture) had just returned from a fortnight's visit to the Darling Downs and South-Western Line, made in connection with the seed wheat improvement work which the Department had in hand. As the visit covered a wide extent of the wheat belt, it was pleasing to record the fact that Mr. Clydesdale was very well satisfied indeed with his observations respecting the prospects of the present crop, which, with a second fall of rain within the last fortnight, had been favoured with just what was required to carry on the young plants resulting from the germination promoted by the first fall. Moreover, there was evidence everywhere that the land sown to wheat was in first-class condition, due largely to the early preparation by summer fallowing of the seed bed and the use of up-to-date tractor plants. The area also was fully equal to, if not greater than, that ordinarily sown each season with wheat. Taking all things into consideration, the present season's prospects were most encouraging.

State Government Insurance Office—Another Record Bonus Year.

The Acting Treasurer (Mr. J. Mullan) to-day (8th June) drew attention to the preliminary report of the Actuary (Mr. T. W. Bremner, F.F.A., A.I.A.) regarding the funds of the Life Department of the State Government Insurance Office to 31st December, 1926.

Mr. Mullan stated that the Insurance Commissioner has received preliminary advice from the Actuary (Mr. T. W. Bremner, F.F.A., A.I.A.) who is now in Brisbane, that after providing reserves for all policy contracts there is a surplus of assets over liabilities sufficient to provide a reversionary bonus for year ended 31st December, 1926, of £2 5s. per £100 assured on participating Whole Life Policies and of £1 10s. per £100 on endowment assurances and endowments. This bonus the Actuary has recommended. The Minister was pleased also to draw attention to the state of the funds, which now total £1,082,275.

The fact that the Office could easily say that every year is a bonus year, and that this is a record year, is striking evidence of the great strides it has made during the nine years it has been in operation.

Wheatgrowing Competition.

The Power Farming Cup, which was competed for by wheatgrowers throughout Australia, was, this year, won by Mr. S. Reilly, junr., of "Karimbla," Cumnock, New South Wales.

The cup was given for the best crop of wheat put in and taken off by a farm tractor, the crop being judged on the following scale of points:—

Yield: One point for every bushel yield per acre, 50. Bushel weight: One-half point for every ¼ lb. above 60 lb., 15. Appearance and uniformity, 15. Trueness to type, 10. Freedom from disease, pests, and foreign odours, 10. Total, 100.

Mr. Reilly, the winner, secured 37 points for yield, 11½ points for bushel weight, and the maximum for appearance and uniformity, trueness to type, and freedom from disease, giving a total of 83½ points. Such a result indicates the high standard of farming that can be attained by tractor farmers.

One of the biggest advantages of the use of tractors in wheatgrowing is that the various operations can be rapidly completed when conditions are such that the best possible results can be obtained.

Starting a Cold Engine.

At this time of the year many motorists experience great difficulty in starting their engines. A cold engine requires a richer mixture, both for starting and running, than a warm or hot one; moreover, an engine heats more rapidly with such a mixture. Hence it is necessary in starting a cold engine to close the carburetter choke a distance proportionate to the degree of cold. Moderately low temperatures require that the choke be closed only part way, and lower temperatures are met by completely closing it. This latter position, however, must be most judiciously used, because then practically all the carburetter air supply is shut off; the choke, therefore, should be slightly opened after the engine has been cranked a few revolutions to obviate the possibility of too rich a mixture, which would prevent ready starting. It is best when starting in very low temperatures alternately to close and then half open the choke while the engine is being cranked, thus preventing the accumulation of vaporised fuel in the inlet manifold and cylinders. As soon as the engine has started the choke should be opened, though not far enough to cause back-firing or materially to reduce the engine's speed. Opening the choke all the way produces a lean mixture and may cause the engine, if cold, to stop running, or, at best, to run with but little power. It, therefore, should remain slightly closed and the engine run until well heated and operating smoothly and quietly, when it should be opened fully.

The Royal Society of Queensland.

The ordinary monthly meeting of the society was held in the Geology Lecture Theatre on 30th May. The President, Professor E. J. Goddard, was in the chair.

Mr. Geo. Preston was unanimously elected as a member.

J. R. A. McMillan, Esq., M.Sc., was nominated for ordinary membership.

In the absence of the author, Mr. C. T. White communicated a paper by Mr. W. D. Francis on the "Anatomy of the Australian Bush Nut (*Macadamia ternifolia*)." In addition to the structural features the author outlined the composition of parts of the nut as revealed by micro-chemical tests. A comparative description of the fruits of the other species of the genus was also given. The paper was illustrated by text-figures and photo-micrographs. A discussion took place in which Messrs. Gurney, White, Bick, and the President took part.

Mr. C. T. White also communicated Dr. B. H. Danser's "Revision of the Queensland Species of *Polygonum*." This revision shows that up to the present fifteen species of *Polygonum* have been collected in Queensland. Four of these are recorded for the first time in Australia. On the other hand three species—*P. lanigerum* R. Br., *P. subsessile* R. Br., and *P. articulatum* R. Br.—recorded previously as distinct species, are now united with the others.

Mr. H. A. Longman and the President commented on the paper.

Stallions Registration Act.

By a proclamation issued under the Stallions Registration Act, it has been approved that that Act shall be in force in the under-mentioned districts:—

> *Southern District.*—That portion of Queensland south of the 25th parallel of south latitude and east of the 146th meridian of longitude, and including the Petty Sessions District of Bundaberg.
>
> *Central District.*—That portion of Queensland south of the 21st parallel of south latitude north of the 25th parallel of south latitude and east of the 144th meridian of longitude, but excluding the Petty Sessions District of Bundaberg.

The Boards have been appointed for these districts and will comprise the following members:—

Southern District Stallion Board.

John Legg, M.R.C.V.S., B.V.Sc.,
Ernest Baynes,
Patrick Short, and
James Sprott.

Central District Stallion Board.

John Arthur Rudd, L.V.Sc.,
James Arthur, and
Ramsden Gledstanes Talbot.

Advertising Queensland.

In the course of a recent public address, Mr. H. W. Mobsby, F.R.G.S., artist and photographer of the Department of Agriculture and Stock, gave an informative account of efforts to advertise Queensland effectively at the several National Exhibitions at which he has acted abroad as a representative of this State.

Mr. Mobsby took his audience in picture and description from the typical farmer at the plough representing the "man on the land," who he explained was at the point where the progress of the State began and on whose success many industries depended. Following on, Mr. Mobsby projected on the screen pictures of the many primary industries, also a portrait of the Minister (Mr. W. Forgan Smith), and explained the activities of the Department over which he presided and that watched and safeguarded the farmers' interests in the way of general guidance and practical field assistance, acting, as it were, as schoolmaster and policeman. Mr. Mobsby described vividly for the benefit of the younger people present the pictures he showed of the industries in several parts of the State, and emphasised the need of parents buying Queensland products in the form of manufactured goods, and asked his hearers to always ask for Queensland manufactures for their daily requirements. The greater the demand, he said, the greater the production; thus Queensland would keep pace with other States and countries in her secondary industries and build up the home market, which was the farmer's most profitable outlet. He then took his audience overseas on an imaginary tour, with vivid descriptions, to the Franco-British Exhibition, London, 1908, the Panama-Pacific Exposition, San Francisco, U.S.A., 1915, the British Empire Exhibition, Wembley, England, 1924, and the New Zealand and South Seas Exhibition, Dunedin, N.Z., 1925-26. At each exhibition Mr. Mobsby was Queensland's representative and arranged comprehensive displays of our products, so advertising Queensland generally, tagether with providing a fund of information to the thousands of visitors at each place. Many fine pictures were associated with each place en route when Queensland's products were shown.

In conclusion, Mr. Mobsby threw on the screen many fine pictures he secured during the recent visit of the Duke and Duchess of York to Queensland, which brought to a close a very educational and instructive evening.

Prolonging the Life of a Car.

Judging by the great number of new cars being sold in the country every month there must be many new owner-drivers making their first acquaintance with the control and management of cars. There are many minor points in running in a car, which, if given attention as occasion demands, will have a material effect in prolonging the life of the car and in reducing the amount of the owner's yearly maintenance bill.

On the way a car is treated during the first few months of running largely depends the measure of its reliability and the length of its life. In no circumstances should a new engine be over-speeded, and it is important to remember that this is a matter of piston speed rather than of car speed. Owners, particularly of the cheaper models, which manufacturers cannot afford to run-in properly before delivery, are advised by the makers not to drive more than twenty to twenty-five miles an hour during the first 500 miles run. The wise man will adhere strictly to this injunction. He will be still wiser if he bears in mind the fact that the principle applies equally to speed on the lower gears. It is useless to keep down to twenty miles an hour on top, if a tight engine is run up to fifteen or sixteen miles frequently on second speed.

Moreover, much patience and care will be wasted if, after the first 500 miles, the maximum is not raised progressively. Most chassis, even of the expensive type, are better driven with a good reserve at all times during the first 1,000 to 1,500 miles. A point applicable throughout an engine's life, which bears materially upon durability, is that of starting and running an engine from cold. The best and most economical method to adopt for battery as well as engine life is to crank the engine two or three times by hand before switching on. It should then be run slowly until it is warmed before any serious load is put upon it. Never race a cold engine, and, if it can be avoided, never drive off the car until the oil has warmed and is circulating freely.

The life of all machinery is dependent, not only upon the quantity of lubricant supplied as a cushioner or insulator, but also upon the quality. Oil loses its vitality with use. Thus, it is important and economical to clean the back axle, gear-box, and especially the engine from time to time, and to replenish them with fresh oil. The power developed by an engine is dependent largely upon the correct setting of the sparking-plug points and the tappets. For this reason clearances should not be neglected, but should be examined and corrected periodically. Do not neglect the maker's instructions as to chassis lubrication. The road wheel bearings—parts that are generally forgotten—should receive due attention.

Farm and Garden Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato-planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this month in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

KITCHEN GARDEN.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

FLOWER GARDEN.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragons), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07 in., increasing gradually to a rainfall of 7.69 in., in February.

Orchard Notes for August.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes from time to time respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with lime and sulphur wash.

Where citrus trees are showing signs of failing, such as large quantities of dead or badly diseased wood in the head of the tree, they can (provided the root system is healthy) be renovated by cutting back the entire top of the tree till nothing but sound healthy wood is left. This should be thinned out, only sufficient main limbs being left from which to form a well-balanced tree, and the trunk and limbs so left should receive a dressing of lime sulphur, or Bordeaux paste.

Healthy trees that are only producing inferior fruit should be treated in a similar manner, and be either grafted with an approved variety direct or be allowed to throw out new growth, which can be budded in due course. The latter method is to be preferred, and an inferior and unprofitable tree can thus be converted in the course of a couple of years into a profitable tree, producing good fruit.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the tree's use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Do not be afraid if you cut a number of surface roots when ploughing the orchard, but see that you do cut them, not tear them. Use a disc plough and keep the discs sharp, and the root-pruning the trees will thus receive will do more good than harm, as it will tend to get rid of purely surface roots.

Planting of all kinds of fruit trees can be continued, though the earlier in the month it is completed the better, as it is somewhat late in the season for this work. The preparation of land intended to be planted with pineapples or bananas should be attended to, and I can only reiterate the advice given on many occasions—viz., to spare no expense in preparing the land properly for these crops—as the returns that will be obtained when they come into bearing will handsomely repay the extra initial expense. Growers of pineapples and bananas who send their fruit to the Southern markets should take more care in the grading and packing of such fruit, as their neglect to place it on the market properly means a big difference in price, and entails a loss that could be avoided had the necessary care and attention been given. The same remarks apply to the marketing of citrus fruits, papaws, custard apples, strawberries, cucumbers, and tomatoes, all of which are in season during the month.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You want only one strong shoot from your cutting, and from this one shoot you can make any shaped vine required. The spraying of vines for downy mildew is not compulsory, but an application eliminates black spot.

Fruit-fly will make its appearance during the month, and citrus and other fruits are likely to be attacked. Every grower should, therefore, do his best to destroy as many flies as possible, both mature insects and larvæ, the former by trapping or otherwise, and the latter by gathering and destroying all infested fruit. If this work is carried out property, a large number of flies that would otherwise breed out will be destroyed, and the rapid increase of the pest be materially lessened. The destruction of fruit-flies early in the season is the surest way of checking this serious pest.

Keep a careful lookout for orange-sucking bugs, and destroy every mature or immature insect or egg that is seen. If this work is done thoroughly by all citrus growers there will be far fewer bugs to deal with later on, and the damage caused by this pest will be materially reduced. Destroy all elephant beetles seen on young citrus trees, and see that the stems and main forks of the trees are planted with a strong solution of lime sulphur.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all deciduous trees should be finished during the month, and all such trees should be given their annual winter spraying with lime sulphur. The planting of new orchards should, if possible, be completed, as it is not advisable to delay. Later planting can be done in the Granite Belt, but even there earlier planting is to be preferred.

Peach trees, the tops of which have outlived their usefulness and of which the roots are still sound, should be cut hard back so as to produce a new top which will yield a good crop of good fruit the following season in from fifteen to eighteen months, according to the variety.

Apple, pear or plum trees that it is desirable to work over with more suitable varieties should also be cut hard back and grafted. All almond, peach, nectarine, and Japanese plum trees should be carefully examined for black peach aphis, as, if the insects which have survived the winter are systematically destroyed, the damage that usually takes place from the ravages of this pest later on will be materially lessened.

Woolly aphis should also be systematically fought wherever present. The best all-round remedy for these two pests is spraying with black leaf 40.

In the Granite Belt the pruning of vines should, however, be delayed to as late in the season as possible, so as to keep the growth back and thus endeavour to escape late Spring pests.

Where orchards and vineyards have been pruned and sprayed, the land should be ploughed and brought into a state of as nearly perfect tilth as possible, so as to retain the moisture necessary for the proper development of the trees or vines and the setting of their fruit.

PLUMBING JOBS ON THE FARM.

There are many little jobs required to be done on the farm which can be successfully accomplished by the occupier. For example, there is soldering. At a recent meeting of the Mount Hope branch of the South Australian Agricultural Bureau, Mr. H. Myers said a little knowledge of soldering would enable the farmer to do many jobs without delay and without the expense of engaging a tradesman. A good set of soldering tools, including an iron, spirits of salts for cleaning the material, and a piece of sal ammoniac, were necessary for the work. The soldering iron should be clean and well tinned to ensure a good job. The iron should be heated and the point filed to give a bright surface, when it should be dipped in the spirits of salts to which had been added a piece of tin. The iron should be rubbed on the sal ammoniac with solder until it was well tinned. Care should be taken to see that the iron was not overheated after being tinned, otherwise the job would have to be done again. It was most important to see that the work to be done was thoroughly clean, otherwise the solder would not take. To do that, the article should be scraped clean, then brightened with emery or sandpaper, and finally cleaned with spirits of salts. Care should be taken when using the spirits to see that it did not come in contact with other than the part to be soldered. If it was allowed to reach other parts that were not being soldered it would eat away the metal. In discussing the paper, Mr. R. L. Myers said after scraping and cleaning the metal to be soldered it was advisable to rub it with damp copper sulphate crystal, when a coppery surface would be obtained. Mr. W. F. Vigar gave the following method of tinning the iron:—Dissolve a quantity of sal ammoniac in a pint of water, and have a piece of flat iron or a similar substance handy, as well as some muriatic acid and solder. Bring the iron to a dull red heat, plunge it into the sal ammoniac solution for a second or two, then plunge into the acid which has been spread over the iron. Melt a few drops of solder on to the iron and rub the bit in it until thoroughly tinned. The honorary secretary (Mr. A. T. Vigar) said if one had much soldering to do, a copper bar should be purchased, and bits made therefrom. A flux which he had found very useful was prepared as follows:—Dissolve as much zinc as possible in acid, and afterwards dissolve sal ammoniac in zinc chloride.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1927.	July.		August.		Moonrise. July.	Moonrise. Aug.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6.46	5.6	6.36	5.20	8.15	8.53
2	6.46	5.6	6.35	5.21	9.4	9.25
3	6.46	5.6	6.34	5.22	9.45	9.54
4	6.46	5 6	6.34	5.22	10 21	10 24
5	6 46	5.6	6 33	5 23	10.54	10.56
6	6.46	5.7	6.33	5.23	11.25	11.28
7	6.46	5.7	6.32	5 23	11.55	p.m. 12 4
8	6.46	5.8	6.31	5 24	p.m. 12 25	12.43
9	6.45	5 8	6.31	5.24	12 56	1.30
10	6.45	5.9	6 30	5 24	1 30	2 22
11	6.45	5.10	6 29	5.25	2.9	3 21
12	6.44	5.11	6.28	5 26	2 52	4.23
13	6.44	5.12	6.27	5.27	3.41	5 30
14	6.44	5.12	6.26	5.28	4 37	6.37
15	6 44	5.12	6.25	5.29	5.37	7.43
16	6 43	5.12	6.25	5.29	6 41	8.48
17	6 43	5.13	6.24	5·30	7.47	9.52
18	6 43	5.13	6.23	5.30	8.47	10.56
19	6 43	5.13	6 22	5.31	9.55	12 0
20	6.43	5 13	6.21	5.31	10.57	..
21	6.42	5.14	6.21	5.31	12 0	a.m. 1.4
22	6.42	5 14	6.20	5.32	...	2.6
23	6.42	5.15	6 20	5.32	a.m. 1.2	3.5
24	6.41	5.15	6.19	5.32	2.6	4.1
25	6.41	5.16	6.18	5.32	3.10	4.52
26	6.40	5.17	6.16	5.33	4.12	5.37
27	6.40	5 17	6.14	5.33	5·11	6.16
28	6.39	5.18	6.13	5·34	6.6	6 52
29	6.38	5.18	6.11	5.34	6.58	7.24
30	6.37	5.19	6.10	5.35	7.39	7.58
31	6.37	5.20	6.9	5.35	8.18	8.25

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

7	July	☾	First Quarter	10 52 a.m.
15	,,	○	Full Moon	5 22 a.m.
22	,,	☽	Last Quarter	12 43 a.m.
29	,,	●	New Moon	3 36 a.m.

Apogee 7th July, at 9 54 a.m.
Perigee 19th July, at 10 24 p.m.

About 6 p.m. or a little before, on 1st July, Mercury will be in a favourable position to be recognised on account of its nearness to the young crescent Moon. Both will be low down towards the western horizon, Mercury being about eight times the diameter of the Moon to the left. Mars will be about 15 degrees above the Moon, and Venus, the most brilliant planet, at a still greater height, being practically at its greatest elongation eastward from the Sun.

It will be interesting to watch the nearer approach of Mars and Venus on the following evening. Conjunction with these two planets will take place, but at times when they will not be visible here.

The earth will be at its greatest distance from the Sun on the 3rd, but not on that account is the season coldest. The temperature depends upon the Sun's declination far north, the shorter hours of sunlight, and the direction of the winds which may happen to prevail.

The two biggest planets, Jupiter and Uranus, will be apparently remarkably close together on and about the 9th and 10th. (Those who like may imagine that some disaster or good fortune will occur on the earth on this account.)

The occultation of Saturn on the 11th, at 9.27 a.m., will be visible only north of the 18th parallel of latitude. An occultation of Theta Librae, at about a quarter to 5 a.m. on the 11th, will be visible below the 27th parallel. On the 19th Mercury will be in inferior conjunction with the Sun, but 5 degrees above it, at noonday, instead of exactly between us and the great luminary. On the 20th, at 5 a.m., the Moon will be passing Jupiter eight times its own diameter above it. The small stars of Pisces will be hardly observable as a background.

A conjunction of Mercury and the Moon will take place a second time this month, at 3 o'clock in the morning of the 28th, when both are below the horizon. Mars also will have a second conjunction, on the 31st, but at an hour not suitable for observation.

6	Aug.	☾	First Quarter	4 5 a.m.
13	,,	○	Full Moon	2 37 p.m.
20	,,	☽	Last Quarter	5 54 a.m.
27	,,	●	New Moon	4 45 p.m.

Apogee 4th August, at 4 18 a.m.
Perigee 16th August, at 1 42 a.m.
Apogee 31st August, at 9 12 p.m.

Mercury will be at its greatest brilliancy on 5th August. On the 6th Saturn will be stationary and in the head of the Scorpion. The apparent nearness of Saturn and Beta Scorpii to the Moon on the 7th will be interesting to observe as soon as twilight permits these three bright objects to become clearly discernable high up in the north.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/-, including postage.

16 SEP 1927

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. 1 AUGUST, 1927. PART 2.

Event and Comment.

Cane Crop Prospects.

THE approximate estimates of the several sugar-mills in Queensland for the present month show an anticipated yield of 3,500,000 tons of cane, which should give, when crushed and manufactured, about 440,000 tons of sugar. Should these figures be realised, this would be an excess of some 50,000 tons of raw sugar above last year's output, but much less than the production in 1925. On the whole the season has been very favourable, and the yield in the southern sugar districts will be considerably higher than last year. The output of raw sugar in New South Wales this season is expected to be 26,000 tons, in addition. The Director of Sugar Experiment Stations, Mr. H. T. Easterby, who recently returned from an extensive tour of duty through the Northern sugar areas, informs us that at Mackay, this year, there is a particularly fine crop and all the mills are anticipating large tonnages. It is expected that this district will cut 700,000 tons of cane, which should yield 87,000 tons of sugar. At Cairns the crops are reported to be weighing on the light side, and as a result of the February cyclone the mill estimates show a reduction on the crops of the past three years. At Babinda, last year, 235 farmers delivered cane to the mill; the crop was cut by 275 men, the daily average being 3.9 tons per man. At the end of June this year wet weather was continuing and greatly hampering factory operations. In the Innisfail district the crops are also cutting on the light side. The rainfall there for the half year amounted to some 123 inches. February was the wettest month, when 45.42 inches were recorded. May was the driest, with 9.82 inches. During the half year over 100 wet days were experienced.

Many of the new seedling canes at the South Johnstone Experiment Station show great promise, particularly the Badila seedlings. It is hoped to make a small distribution of a limited number of these next year.

The Tully district has experienced more rain than either Babinda or Innisfail, the total for the first six months of the year being 153 inches. The mill commenced crushing on the 26th May, and is putting through a weekly cane weight of about 7,000 tons.

In the Lower Burdekin, the Inkerman and Pioneer mills, which had been stopped by rain, resumed on the 12th July. The cane has made good growth this year, and the fine rains will save large irrigation costs. Kalamia mill is now crushing, and is expecting to receive a heavy tonnage at the carrier. A large acreage has been planted for Pioneer and Kalamia for next year, the estimate being over 9,000 acres for the two mills. The young cane looks particularly well, and if the season continues favourable the mills will have some difficulty in getting through the 1928 tonnages.

The Queensland crop generally, while not so heavy as in 1925, will be greater than that of last year. The commercial cane sugar in the cane is not too high in Cairns, Babinda, Innisfail, and Tully at present, owing to excessive rain, but is good in the Lower Burdekin and Mackay districts.

The Citizen of To-morrow.

"ANYONE noticing them could not fail to be struck with the exceptionally healthy physique and cleanliness of the boys and girls who attended the schools in Queensland. When the Empire parliamentary delegates visited Brisbane the fine types of school children impressed them, and I was told that the system of education in vogue certainly must be conducive to the building up of citizenship of character."

The Minister for Education (Mr. T. Wilson) incorporated these words in his speech at the opening ceremony of a new State school recently. Mr. Wilson added that the well-dressed children who attended the schools expressed the undoubted prosperity and happiness of the whole community. He referred to the frequency with which he was called on to perform such functions, and said that it was a clear indication of the growth and progress of the State. The standard of civilisation attained by any country might be estimated by the number and character of its educational establishments, and considering the fine institutions which Queensland could boast of, they must recognise that, in common with the other States, Queensland had a foremost place among the progressive components of the British Commonwealth.

"Queensland and Loyalty Synonymous Terms."

A HEARTY welcome was tendered to his Excellency the Governor of Queensland, Sir John Goodwin, on 27th June, by ex-members of the A.I.F. Responding to the toast of his health, Sir John said:—"Englishmen one and all know the sterling metal of which the Australian troops were composed—how they could work, and how they could fight. It is with intense pride that we feel that we are of the same blood. . . . . I do not believe that any man, even for an instant, could doubt the loyalty of Australia or of Queensland. It would be impossible for anybody to do so. Queensland and loyalty are synonymous terms, and this has been proved over and over again. Queensland must feel very proud of the fact that nearly 50,000 of her sons went overseas to enter on a fight for humanity's sake."

The Fuel of the Future—Modern Road Transport.

WHILE in Brisbane recently the chairman of the Development and Migration Commission (Mr. H. W. Gepp) described the work and ramifications of the new Federal organisation at a representative public gathering. He added interest to the address by picture demonstrations of transport machinery which it was proposed to use in the moving and conservation of fodder in Australia.

At present, he said, the Commission was investigating the economics of the gold-mining industry throughout the Commonwealth, the effects of tariffs, of legislation, or regulations under the Mining Acts, and the effect of taxation on investments in gold mining.

Regarding mechanical transport, Mr. Gepp added that he believed that special mechanically propelled vehicles would be co-ordinated with the railways, and that there would also be road trains of the right type, possibly driven by our own fuels. The fuel side of the question was interesting. Coal, coke, and charcoal were all likely fuels. In France to-day they had completely solved the problem of the utilisation of charcoal in place of petrol. The comparative costs of petrol and charcoal in Australia made the charcoal a means of saving the westerner a great deal of expense in his transport.

The transport problem was almost inseparable with that of fodder conservation, which in itself offered a wide range of possibilities.

"This Pacific Eden."

A NEWFOUNDLAND member of the Empire Parliamentary Delegation which visited Australia last year has set down his impressions in a book brightly and carefully written, and from which it is evident that he found Australia a good country and Queensland a land of beauty, progress, industry, and hospitality. After a short stay in the capital on his way North with the Delegation, he has this to say of his Brisbane visit:—

> "As the train steamed out from the station, the consensus of opinion was that whatever experiences the visit held in store, the kindness, goodwill, and cheery friendliness of the Queensland capital, though it were equalled, could not be excelled."

About the Doctrine of White Australia, he writes:—

> ". . . . The courage with which the task has been enterprised, one which would have been regarded as impossible of successful issue a few years ago, commands admiration. Queensland has proved, beyond question, that the adaptability of the white race, though it may be at its best in the temperate zones, is not confined to them. What Greely and Peary, Steffansen, our own Bartlett, and others have proved by their arctic experiences, Queenslanders are daily proving in the tropical regions of the State—that the British race, by sheer courage and grit, is able to overcome all handicaps of either tropical or arctic temperatures."

Enthusiasm is expressed concerning the scenery in North Queensland, and he is amazed at the beauty of the Barron Falls. He writes, too, of the Atherton Tableland, Yungaburra, Lake Eacham, Cairns, Townsville, and the towns all down the coast at which the party stopped. His last chapter on the visit to this State is called "Farewell to Wonderland," and his words are—

> "One would fain linger longer amid the infinite variety of this delightful land, yet to omit some reference to the three Queenslands—North, Central, and South—as a fruitgrowing paradise, would be unpardonable. The claim made that Queensland can produce all the cultivated fruits of the world is not without ample warrant. . . . . (Here is quoted a poem on Queensland.) Such is the rhapsody of an unknown patriotic poet, and, if somewhat extravagant in its claims, it interprets in large measure the feelings of those who in their ten days' tour gained many glimpses of this Pacific Eden, and desired more."

The remainder of the book deals with the party's journey from Brisbane to Fremantle. One gathers from this book that all members of the Parliamentary Delegation left Australia filled with vivid and pleasing impressions of the country and its people.

Tobacco Growing in Queensland.

IN commenting on the interest his Department was taking in the revival of tobacco-growing in Queensland, the Acting Premier and Minister for Agriculture, Mr. W. Forgan Smith, informed the Press recently that the position of the grower of tobacco in Queensland at present is not at all satisfactory, and without some encouragement is not likely to improve in the immediate future. The limited amount of pipe-tobacco leaf grown here is raised principally in the Inglewood and Texas districts. As this leaf is air-dried and not flue-cured in the manner required by the manufacturer, lower values must be expected. Queensland, however, has the quality of soil required to produce a good leaf, and, apart from seasonal irregularities, climatic conditions are favourable. The Bowen and Proserpine districts have already demonstrated their fitness to produce a high-class cigar leaf, but market fluctuations have prevented any expansion of the industry there. Some years ago, an appreciable tonnage of tobacco leaf was grown in Queensland, the figures for 1905 being 1,145,760 lb. of dried leaf from an area of 933 acres. In 1925, the return was only 103,523 lb. of dried leaf from 96 acres. These comments are advanced merely to indicate that serious consideration of ways and means is required in order that the tobacco-growing industry could aspire to some degree of importance in Queensland, and, among other matters, it is Mr. Forgan Smith's intention to have personal consultations with the Federal authorities and with the managing director of the British Australasian Tobacco Company when he is again in the South next month. It may be of interest to note that from 1920 to 1925, there were introduced into the Australian Commonwealth, an average of 21,060,779 lb. of tobacco per annum. Roughly, this can be put down as the produce of at least 20,000 acres of land. This will give some idea of the possibilities of tobacco as a primary industry for Australia. The bulk of the tobacco imported into the Commonwealth is what is known as unmanufactured, and the value of the importations of this particular form of tobacco into the Commonwealth in 1924-25 was £2,005,939 sterling. The duty on tobacco ranges from 2s. a lb. payable on unstemmed unmanufactured tobacco to 13s. a lb. for cigars.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (23rd June, 1927) of observations for the period May-June 1927, from the Southern Assistant Entomologist at Bundaberg, Mr. R. Mungomery:—

Red Markings on Cane Leaves.

Along the midrib of certain cane leaves, during almost any period of the year, can be seen a number of reddish markings or blotches, which have often been regarded with suspicion by many growers. These blotches vary in colour from light pink when they first appear, to a darker red in their older stages, and ultimately the tissues involved present a dark, dead appearance. In certain varieties of cane this is very noticeable, and at times constitutes an almost complete reddening of the whole midrib. The variety D. 1135 is not usually badly affected, but Q. 813 is very outstanding in this respect, and from the frequent occurrence of these conspicuous markings one often hears the opinion expressed that the particular cane stick, or paddock of cane, as the case may be, is badly diseased. In this connection I would like to emphasise that these red patches have no relationship to the ''gum streaks'' which are commonly referred to as a means of identifying the gumming disease of sugar-cane. No doubt this mistake is often made by those unacquainted with the true symptoms, and for a description of these distinctive ''streaks'' the reader is referred to the various reports of the Pathologists of this Bureau.

If these red patches be carefully examined, it will be seen that in their centres, or at intervals along them, appear longitudinal slits of a somewhat deeper colour than the surrounding tissues, and these slits are the punctures which certain insects make in the midrib when laying their eggs. On the top of each slit can be seen, with the aid of a small magnifier, a thin, white, thready substance which the female insect has also left behind, when engaged in the operation of egg deposition.

Sorghum, Johnstone grass, &c., are similarly affected, and the insects concerned are numerous species of leaf hoppers. In the Southern districts the principal hopper associated with cane is *Perkinsiella saccharacida* Kirk., other species being of secondary occurrence. Some of these latter invariably lay an egg mass flat across the leaf blade similar to certain species of moths, whereas *P. saccharacida* seems to be the only species found attacking cane in this locality, which punctures the midrib in the following manner:—The epidermis of the midrib is pierced by the hopper's sharp ovipositor, and tiny banana-shaped eggs are inserted at an angle into the inner tissues, there to remain during the incubation period, after which the hopper nymph emerges. During these processes the plant tissues are broken, and this affords an entry for the spores of a fungus organism, which, on germination and further growth, invades the surrounding plant cells, causing the reddening already referred to above, and a corresponding increase of the red patch as the fungus continues to grow. At most this may cause a slight interruption in the flow of cell sap, but such an injury is usually regarded as being of minor importance only.

The midrib borer, *Cosmopteryx dulcivora* Meyr., which is a caterpillar of a small moth, is also responsible for injury to the midrib, being characterised by irregular tunnels, which as they become older produce the reddening similar to that produced by leaf hopper attack, but this insect has not been observed by the writer south of Mackay.

Parasites of the Leaf Hopper.

In reference to the leaf hopper *P. saccharacida*, this insect is kept from doing great injury to sugar-cane, by the number of parasites and predators that attack it. Some of these have been successfully introduced into other countries for the control of this pest, where its ravages had hitherto assumed serious proportions. In this respect it will be of interest to note that several specimens of a small chalcid wasp, *Paranagrus optabilis* Perk., have been bred at the Bundaberg Laboratory from the eggs of this hopper, the material having been collected on the Southern Sugar Experiment Station.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (18th July, 1927) for the month of June-July, 1927, from the Southern Assistant to the Entomologist, Mr. R. W. Mungomery:—

In the course of the period Mackay and the outlying districts were visited, for the purpose of ascertaining the extent of the injuries caused to cane through insect attack this year, and of advising farmers of the best methods to follow when undertaking control measures. On the whole this large district is relatively free from pests, and this fact, combined with the excellent growing conditions which have obtained since the early part of the year, places Mackay in a very satisfactory position as regards the total tonnage of cane which the various mills anticipate treating in the coming season. Individual growers have incurred rather severe losses, and, at first, this would seem to falsify such a generalised statement concerning the losses through pests, but fortunately such instances are comparatively few, and the actual damage amounts to a small figure when examined against the total of the season's estimate. The chief insect pests met with the the grub of the "greyback" cane beetle *Lepidoderma albohirtum* Waterh., and the weevil borer, *Rhabdocnemis obscurus* Boisd.

Cane Grubs.

As in former years, the chief damage is that inflicted by the notorious "greyback" cockchafer grubs, and the centres that have suffered the worst infestations are Sarina, Mount Jukes, Kungurri, and Habana. This sequence gives roughly the order of severity. In certain areas the degree and extent of the infestation has increased in comparison with that observed last year. Especially is this noticeable at Kungurri, whilst infestation in the Habana area appears to be of a milder nature.

Sarina and Mount Jukes have again suffered bad losses, and it is a veritable scene of destruction which confronts the eye when viewing these otherwise potential sugar-producing areas. Both of these areas were visited last year, and farmers were advised to try soil fumigation with either carbon bisulphide or paradichlorbenzene in the first months of the year, when the grubs are in their younger stages. However, the current year opened up very auspiciously with its copious rains, and most growers were under the impression that, with such a wonderful growing season, grubs would be of small consequence, and the idea of fumigating their cane land was temporarily abandoned. This proved a fallacy, for it is well known that grubs are able to do extensive damage in wet seasons as well as in dry ones, though dry conditions always augment the actual grub damage. At the present time acres of cane may be seen levelled to the ground, and this is a repetition of happenings in previous years, when only about one-half of the tonnage estimated in the preliminary estimate was realised when harvesting operations had been completed. Good crops of Badila, E.K. 28, Pompey, Black Innes, and D. 1135 were destroyed this year by grubs, therefore, when some of these deeper rooting canes have been unable to withstand the attack, it is futile to plant the shallower rooting types like Q. 813 and Clark's Seedling in friable soils which are liable to become grub infested. The results in nearly all cases are sure to be disastrous. Grub attack may affect cane in the following ways:—

(1) Reduction or total loss in tonnage.

(2) Lowering of the sucrose content of the juice.

(3) Failure to produce ratoons, or, at best, subsequent ratoons are spindly, and are liable to the whole complex of root fungus troubles.

Since last visitation it is particularly pleasing to notice the increased interest growers are taking in control work, and during the coming year I anticipate a much greater activity in fumigation work. The collecting of beetles and grubs must be supplemented by fumigation, and every means must be employed to oust the grubs from cane lands, otherwise it follows as a necessary corollary that the cane must simply be abandoned to them. Fumigation is effective and also practicable, as shown from the large scale operations that are being conducted on some of the plantations in the North of Queensland against the same grub. Moreover, a subsidy is granted by the Mackay Pest Destruction Board, amounting to half the cost of the fumigant used in the destruction of these pests, so this brings down the cost of application considerably, coming well within the reach of all growers. In grubby areas fumigation is a form of crop insurance, and now is the time to procure injectors and fumigant in anticipation of another severe infestation in the coming year. Such preparation will pay in the end.

Weevil Borer.

A somewhat sporadic infestation of this borer is noticeable throughout the district. The larvæ were found tunnelling cane at Mount Jukes, Habana, Kungurri, and Pleystowe. Mostly standover canes are the ones affected, but otherwise the infestation is light. This is no doubt due to most of the cane being cut last year and sent to the mill, thus killing off developing larvæ, and leaving few breeding places for the adult weevils. Growers are urged to continue cutting all cane harbouring these pests, and to burn off the trash and any rotting cane in a badly infested field.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following supplementary report (5th July, 1927) on the Mackay district, from the Assistant Pathologist, Mr. E. J. F. Wood:—

Mosaic is present in every area, but only to a small extent, except in Farleigh, Mount Jukes, and the district round Gargett, Finch Hatton, and Netherdale, and at Habana. There are a few farms, too, at Sarina that have more than their share of the disease. Where there is no grub infestation, Q. 813 is a very desirable variety for its resistance to the disease, and in the grub areas Q. 855 should be substituted. I should advise the farmers in the more heavily infected areas to procure clean seed and to plant this. I saw at Finch Hatton several blocks of plant cane in which Mosaic is already showing up, though the plants are only about a month old. There is no need for this sort of thing if the farmers are careful, and select clean seed. On a farm at Habana I found some Shahjahanpur 10, the worst cane for Mosaic, and nearly every other variety on the farm had become infected through this cane.

Leaf Stripe was seen by Mr. Mungomery at Hatton in green D. 1135, and the specimen was shown to me for identification. The farmers and millers in this area should make every effort to eradicate the diseased stools before infection becomes general.

Red Rot is to be found from Inneston north to Mackay, and maybe beyond. Specimens shown at Field Day were procured from a farm not far away, and a field of E.K. 28 was seen to be full of it at Habana.

This is a warning that this rather complex root and stem trouble is liable to become a serious epidemic, and the rules that I laid down at Field Day should be followed as closely as possible till further experimental work is carried on. From the nature of the disease they should prove effective if correctly applied. I am afraid that with the methods of cultivation employed the disinfection of plants would be useless, as the ploughing away and chipping will cause wounds which will be sufficient to enable the fungus to enter the tissues. Still this might be tried on a small scale by any farmer who is experimentally inclined.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from the Assistant Pathologist, Mr. E. J. F. Wood, the following report (14th July, 1927) on the Proserpine district:—

Proserpine is a district comparatively free from disease, but this does not mean that the farmers should relax their vigilance on this account. On the other hand it behoves them to work the harder so that the little that is in their district should be eradicated. It is only natural that many farmers in a lightly infected area may not be able to recognise many of the diseases, so it will be well to get rid of any plants which have any unusual appearance in order to be on the safe side. If an officer of the Bureau is near at hand it is, of course, best to ask for his advice on the trouble, or to keep a record of the symptoms, as these are often sufficient to characterise a disease. To do this it is necessary to observe any peculiar leaf symptoms, note the appearance of the root and stem, and cut the latter lengthwise at the butt end and tip, and note any red streaks or patches, any pithiness or hollowness, &c.; also cut the stem across and place in a billy-can near the kitchen fire for some hours. This will serve to identify gumming disease, by the yellow gum on the end of the cut stick. If you do this carefully it will be possible for the officer to give you some idea of the trouble. I was asked several times on Field Day at Mackay, "Some of my cane died off from the top; what was wrong with it''? The farmers could give me no more information, and expected an answer. They were quite surprised when I gave them a list of half a dozen diseases, and several insects that could cause these symptoms.

Many farmers in this area have a strong desire to bring in plants from outside, but this is considered highly inadvisable. The district has all the main varieties; and also several classes of soil—scrub, forest, river flat—so what need is there for this introduction. If the area were highly diseased I could understand the request for clean seed, but not as things are now.

Against this introduction is a very strong argument—that the introduction of plants to a comparatively clean area is fraught with considerable risk of bringing in new troubles.

In the Mackay district is Red Rot, which seems to have a wide distribution, and is much influenced by the seasons, so that it is hard to tell at present just where it is distributed. Now Red Rot influences the density and tonnage, and gives trouble to both the farmers and millers, so it is not worth while for the farmers to introduce this disease along with plants from Mackay. Of course the plants might be healthy, but on the other hand they might not, and I am unwilling to undertake the responsibility of certifying to plants from the Mackay area.

Farther south, in Bundaberg and Nambour, is gumming, another serious trouble which once practically drove the farmers at Cudgen and other parts of the Northern Rivers from their lands, and is threatening to do so again at Broadwater. No sane farmer would wish to introduce plants from these areas.

Maryborough and Beenleigh have Fiji disease, and are quarantined.

Innisfail and Babinda have Leaf Scald, and Ingham has gum, and further north Leaf Stripe is prevalent.

Need I say more on the advisability of keeping to your own plants? Change about on your own soils but do not go outside. This moral applies to other places than Proserpine, especially to Koumala, Carmila, and Flaggy Rock, and to Bucca and Pialba. In fact, it would be ideal to institute a quarantine in each district, whereby plants could only be sent to another district through the two Local Producers' Associations concerned, and that after an inspection of the field by a pathologist. Then you would insure clean plants, but until these highly necessary protective measures are taken, imported seed cane is bound to be an uncertain proposition.

With regard to the canes distributed by the experiment station at Mackay, these restrictions do not apply, for the canes are tested and examined by a pathologist frequently, and the chemist in charge also knows the diseases well, so that now these canes are under the frequent supervision of experts and are perfectly safe. It will be well for the farmers to try and procure the best of the available new varieties. P.O.J. 2714 has the reputation of being immune or highly resistant to Mosaic. I am personally unable to vouch for this as the cane has never been tested in this respect in Australia. It is, however, a heavy cropper with so far a good density, and as far as the Mackay station is concerned is free from all signs of disease. It is a green to bronze cane rather like E.K. 28, but with much longer joints, more waisted, and without the short joint of the latter variety. The eye is pointed and the top fairly long and dark, rather like the top of E.K. 28.

Cane-killing weed (Striga) is still present on a farm at Kelsey Creek, and the planting of a legume crop on the affected field is suggested as a remedial measure; frequent ploughing is also essential. The white bands on the leaves of some varieties, such as Q. 813, M. 1900 S., D. 1135, M. 189, &c., are not due to a disease, but to the chilling and sudden heating of water in the leaf spindle, owing to a cold night followed by a hot morning. (This theory was propounded by Mr. D. S. North at the Sugar Conference at Hawaii some years ago.) Ice inserted into the spindle will produce the same result. For want of a name it is known as Sectional Chlorosis.

The red midrib of the leaves is, as stated previously, due to insect agency, and not to any disease. Mosaic is slight on a few farms, and those that have this trouble are advised to get rid of the diseased stools as soon as possible. With regard to this disease, Q. 813 and H.Q. 5 are the most resistant varieties known in Queensland and are grown in this area.

Leaf Scald is still present on several farms at Conway, and was till recently on a farm in the Proserpine area itself, so that it may easily be still more widely distributed. It is at present in the acute stage and is hard to identify as such without the appearance of the chronic symptoms. These include a white pencil line along the leaf, especially in side shoots and suckers. The sticks die, and the buds sprout all down the stem, these having the leaf symptoms and red fibres inside running down through the stick. In the acute stage death occurs without any definite symptoms. Fields showing Leaf Scald should be ploughed out as soon as possible and fallowed under green manure for a spell.

Red Rot is appearing on farms in the Glen Isla, Strathdickie, and Up River areas, and may be even more widespread, though it does not as yet seem to cause any appreciable damage. But it will be as well to look carefully to plants of Clark's Seedling and to reject any showing a red butt to the stem. If the farmers have read my previous report on the Sarina area, they will have some idea of the seriousness of the Red Rot problem in that area, and also know something of the methods suggested for its control. This disease will cause serious fluctuations in the density, and, I believe, these have been occurring to some extent at the mill; the existence of this disease helps to explain them. The cane in Cannon Valley seems to be on the whole healthy, and Red Rot was not observed there. Q. 813 is healthy throughout except for a little Leaf Scald at Conway.

Finally, grubs are occurring at Conway, and Linear bugs were seen there in profusion on the Badila, while the stem borer is doing some damage, which may easily be confused with the damage due to Red Rot or Leaf Scald in its present stage. Breaking the stick will serve to identify this latter pest.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Entomologist at Meringa, Mr. E. Jarvis, in connection with the work of that Experiment Station during the period April to May 1927:—

Field Experiments in Grub Control.

A series of experiment plots were laid out during October last on high land of volcanic origin at Meringa, the soil being of a friable nature, well drained, and situated on land which is usually grub-infested more or less badly each season.

A couple of acres on this site were rented about the end of October. A heavy disc plough and three horses were used to turn up the ground from 8 to 10 inches deep. After the first harrowing it was still very lumpy, owing to the hard dry state of the soil. Early in November an acre was planted with top sets of Badila, in hopes of getting a strike by the time beetles were ready to oviposit. The soil, however, was dry to a depth of 7 or 8 inches, so that unless rain fell before the end of the month replanting would be necessary.

It so happened that no rain worth mentioning fell until 28th December, when 1.16 inches were registered at Meringa. On 30th December we replanted this area of Badila with D. 1135, and early in January put in a second acre with the same variety. During the cyclone experienced on 10th February the young cane on our experiment plots, being only 12 to 18 inches high, did not suffer much; but three days later, on the 13th when 14.70 inches of flood rain fell, growth of these plants was checked owing to the planting furrows having been filled to the top with fine soil, silted into them by the surface water.

Notes on Soil Fumigants.

Amongst results obtained up to the present those relating to the use of paradichlor. and carbon bisulphide will interest cane farmers. Our tests with the former of these fumigants proved that, when treating very young plant cane growing in friable soil during midsummer in dry weather, injections should not be made nearer than 5 to 6 inches from the plants.

Past experimentation has demonstrated the danger of injecting either paradichlor. or carbon bisulphide amongst tender roots of young cane shoots, such procedure being always liable to injure or kill them, especially at a time when the sets are beginning to root freely. Later on, when cane has attained a height of 3 to 4 feet and is well rooted, no ill-effects occur, although carbon bisulphide, if injected into the centre of a big cane stool, will sometimes check plant growth for a few weeks.

Ratoon cane 3 to 4 feet high is not injuriously affected by either of these soil fumigants; conclusive proof of which was secured in 1924, when it was observed that on experiment plots laid down in canefields free from grub attack at Highleigh, Freshwater, Sawmill Pocket, and Woree the stools on both treated and control plots, when examined a couple of months after application of the chemical, were found to be of uniform height, colour, and general appearance; proving that such fumigation had not in any way injured root development.

The latest quotations for paradichlor. from the Solway Sales Corporation, New York, is 8½d. per lb., in barrels containing 250 lb. (f.o.b. Solway, America). It can also be procured from Messrs. Buzacott Limited, of Brisbane, in 32-lb. tins at 1s. 1d. per lb.

Interesting details in connection with results obtained on our experiment plots this season against cane grubs by the application of other insecticides and fumigants will be available for report in the near future.

Propagating Tachinid Fly Parasites.

In response to a letter received last February from Mr. G. F. Hudson (secretary of the South Johnstone Cane Pest Destruction Board), asking us to liberate tachinid flies in that district, two consignments of this useful parasite were forwarded from here to Innisfail on 13th April, in charge of Mr. J. H. Buzacott, Assistant to Entomologist. These flies were released next day on two different selections at Japoon, each grower concerned receiving twenty-five living specimens of the parasite, and six sticks selected from a breeding-cage at our laboratory, and containing collectively from 200 to 300 puparia from which fly parasites were due to emerge about a week later.

The living flies were let go amongst borer-infested cane; and the breeding-boxes holding the sticks with puparia established also in affected canefields in the usual manner—viz., by being supported on four legs standing in tins of water to prevent subsequent invasion by ants.

Later, on 25th April, a consignment consisting of twenty-three living specimens of *Ceromasia sphenophori* was sent to the South Johnstone Sugar Experiment Station, in order to restock a large breeding-cage built at the station recently for the purpose of rearing specimens of this parasite for local distribution.

Notes on French's Cane Beetle *Lepidiota frenchi* Blackb.

While ploughing out or preparing cane land on forest country for early planting, growers are very likely to notice numbers of small grubs turning up in the furrows.

These will most probably prove to be second-stage larvæ of *Lepidiota frenchi*, which during the present year may be expected to occur in considerable numbers, owing to the big general emergence of beetles of this species witnessed in December and January last. Gross infestations of such grubs should be carefully noted, with view to possibility of future trouble in September and October next, by which time these grubs (although comparatively harmless at present) will have assumed the third or final stage of growth and be able then to severely damage young plant cane. Such risk could, however, be avoided or reduced to a minimum by hand-picking these second-stage grubs of *frenchi* during June, before they have gone down out of reach of the plough to construct chambers in which to pass the colder months and ultimately moult into the third instar.

Ants Nesting near Cane Stools.

Carbon bisulphide should prove a successful fumigant for destroying colonies of ants situated around stools of cane or tree-trunks, &c. Before treatment it is of the utmost importance to see that the soil be thoroughly free from excessive moisture to a depth of about 9 inches, as otherwise the fumes will not be able to penetrate deeply enough to destroy all the ants.

Well-worked soils of light mechanical nature are eminently suitable for such fumigation, but carbon bisulphide should not be applied to them until about a week has been allowed to elapse after heavy soaking rain. Clays or clay loams, on the other hand, naturally retain their moisture for a longer period, and unless well drained and cultivated a fortnight should elapse before injecting the above fumigant. In the meantime, however, much good may result from the use of poison-baits. Amongst the many advocated for this purpose the following has proved one of the best:—9 lb. granulated sugar, 9 pints of water, 6 grams tartaric acid (crystallised), 8.4 grams sodium benzoate; these should be boiled for thirty minutes and allowed to cool. At the same time 15 grams sodium arsenite should be dissolved in hot water and cooled. The poison should then be thoroughly stirred into the syrup and the whole carefully mixed with 1¼ lb. of honey.

This bait is weak in action, with the result that it is continually attended, the workers carrying it to the nest and feeding it to the queen and the larvæ, until eventually the entire colony is exterminated. The best container is said to be a can, so dented that the ants can get in under the lid, while the lid still keeps out the rain. A sponge should be floated in the syrup, or a sponge dipped in it may be placed in a paraffined paper bag pierced with holes to admit the ants, and another paper bag, similarly waterproofed, used to cover the whole from the weather.

CANE BEETLES AND CLIMATE.

PAST AND PRESENT POSITION OF THE CANE GRUB PROBLEM.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (30th June, 1927) from the Entomologist at Meringa, Mr. E. Jarvis, dealing with the subject of climatic controlling influences exercised by our annual rainfall on the numerical increase of cane beetles during the past twenty-three years, 1904-1926.

Early Occurrence of the Grub Pest.

Although it is about forty-four years ago since the larvæ of our well-known "greyback" cockchafer (*Lepidoderma albohirtum* Waterh.) were first noticed damaging sugar-cane in the Mackay district, this species was not generally recognised as being a serious cane pest until about twelve years later in 1885.

During the following years (1885 to 1888) cane beetles were reported to be especially injurious on various plantations in the above district, so much so that in some cases hundreds of acres were totally destroyed by grubs and had to be ploughed out.

More recently, in the nineties, the trouble became so acute on the Herbert River that concerted action was taken by the growers at Ingham and elsewhere to combat or control the ravages of this insect, by the adoption of such common-sense methods as that of collecting the grubs and beetles, &c.

During the year 1904 the pest received a setback, owing to the rainfall for June to October of the preceding season having been 6.52 inches less than the average for these five months, while the total annual precipitation for 1904 dropped to 62.61 inches.

In 1905, however, grubs were said to be troublesome in our Northern canefields, and two years later (1907-1908) were reported by the State Entomologist to have caused great damage in the Cairns district.

This was to be expected, since it appears that no climatic check of any importance has been experienced between 1905 and 1907. During this outbreak of the pest no less than 22 tons of these beetles were collected from feeding-trees, and other control methods resorted to (1909-1911), with the result that in 1912 the activities of this insect were very noticeably checked.

At Mackay also during this same period (1909-1911) cane beetles were very much in evidence, and the growers expended a sum of £1,256 in capturing them. It will be of interest to mention that the enormous numerical increase of this cockchafer in the Cairns district throughout 1909 to 1911 was due to the phenomenal downpour experienced, the records for these three consecutive years being 105.63, 114.77, and 158.64 inches respectively, as against our annual average rainfall of 91 inches. It is worth noting, too, that in 1909 to 1910 the precipitation during the most critical period in the life-cycle stages of this cane pest—viz., June to October—happened to be 13.19 inches, as against 3.37 inches, the recognised average for these three months in the Cairns district. Moreover, the occurrence of such eminently favourable weather during its pupal state was followed two months later by a further generous fall of 161.17 inches in the five months of December 1909 to April 1910; so that ideal conditions were also present for development of the egg and larval stages of this beetle.

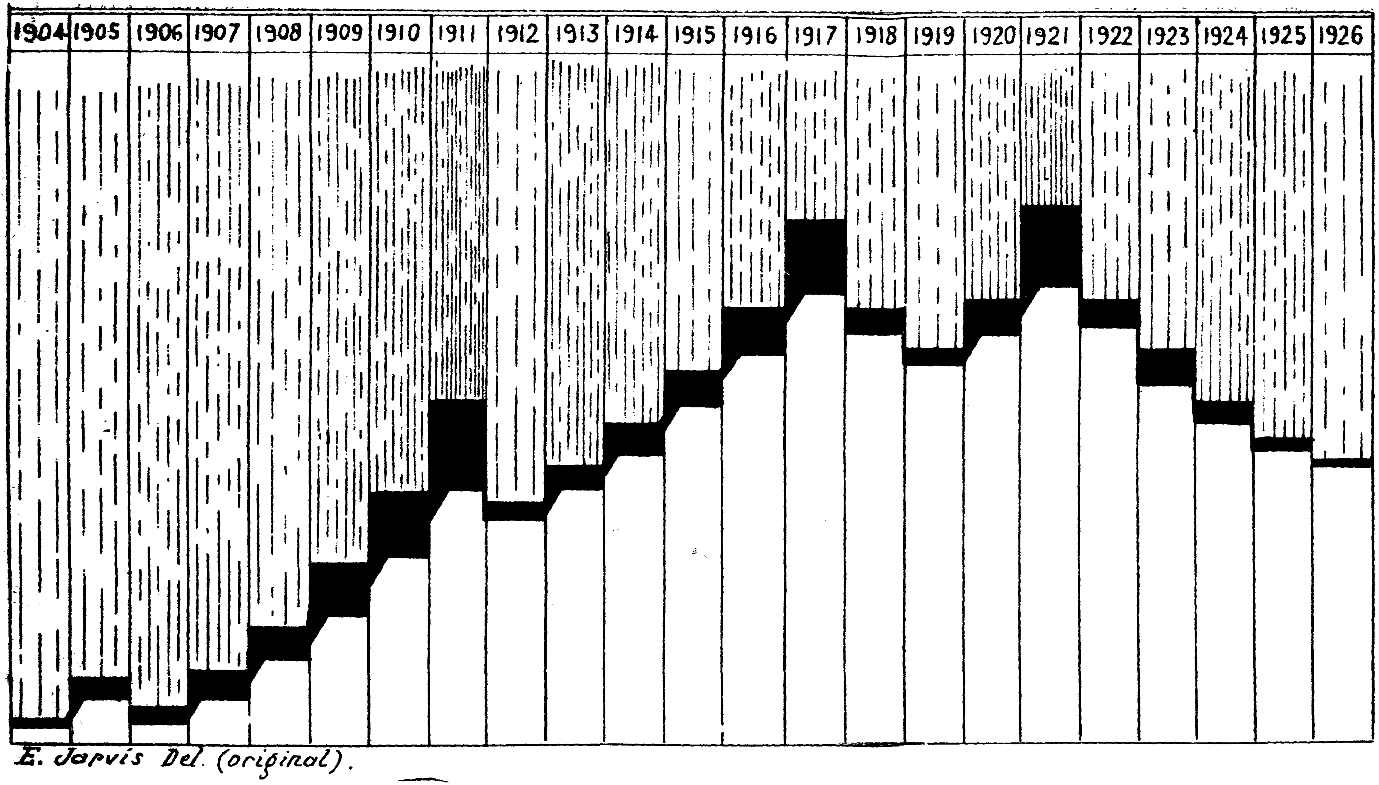
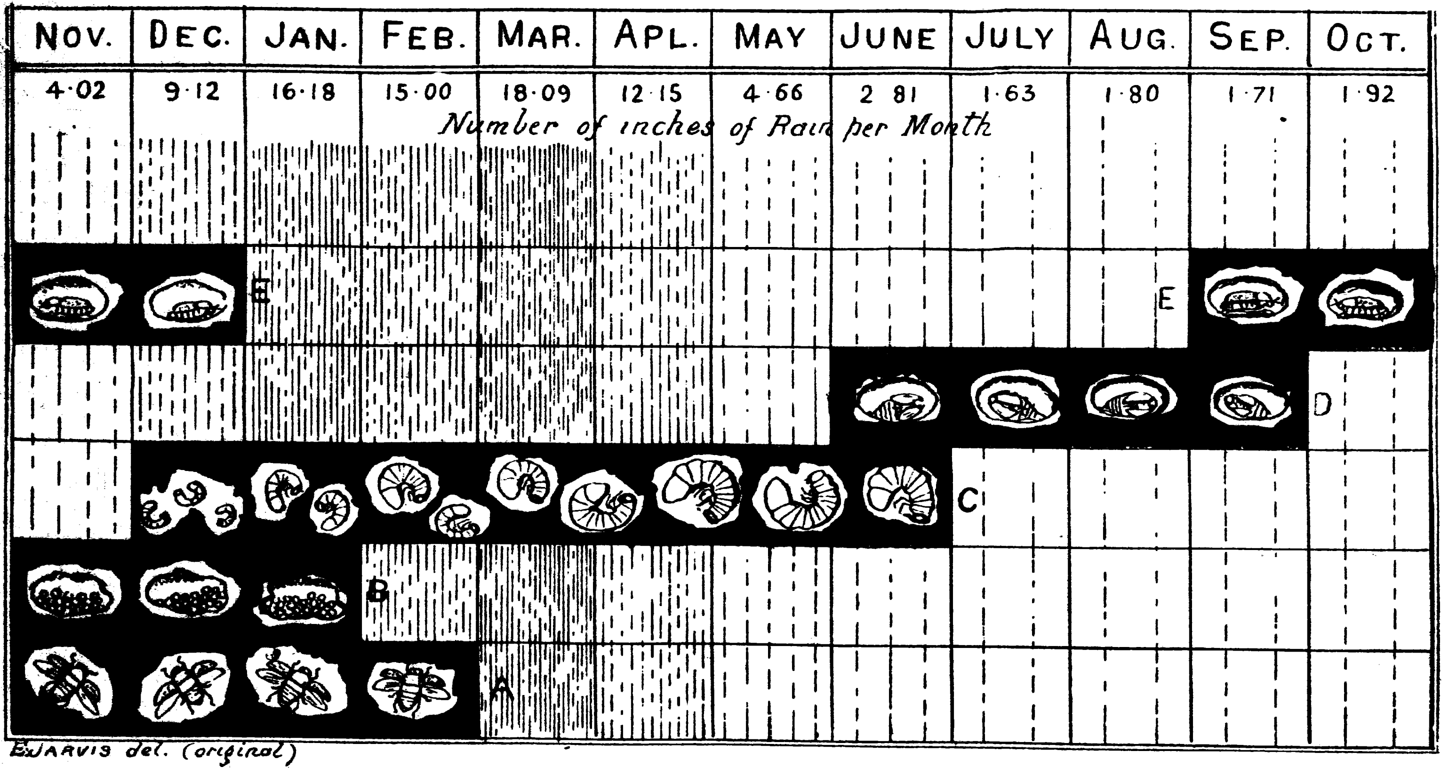


PLATE 18

Diagram showing varying degrees of Grub-infestation experienced in the Cairns district during the past twenty-three years. The dotted lines represent amounts of annual rainfalls received.



E. JARVIS del. (original)

PLATE 19.—LIFE-CYCLE STAGES of the "GREYBACK" COCKCHAFER (*Lepidoderma albohirtum* Waterh.).

Diagrammatic view of the average annual rainfall, together with position during each month of Egg, Grub, Pupa, and Beetle condition.

A. Period of aerial activity of the beetles
B. Period during Egg stage, passed in subterranean chambers.
C. Seven months occupied by first, second, and third larval instars.
D Duration of the Pupal Condition.
E. Months in which beetles are liable to imprisonment, owing to drought conditions prevailing from September to December,

Appointment of an Entomologist for the Sugar Industry.

Growers having at last become seriously alarmed, an entomologist procured from America was attached to the Bureau of Sugar Experiment Stations, with instructions to devote his attention exclusively to the study of the cane grub problem, and, later, additional entomologists were appointed.

Although the weather in 1910 had proved so favourable to development of the pupæ of this beetle it encountered a severe climatological check the following season (1911), when the rainfall for the period June to October chanced to be only 4.13 inches, considerably less than half the average amount for that period. This circumstance, coupled with an abnormally low annual rainfall during 1912—viz., 55.26 inches—accounted for the comparative freedom that year from serious damage to the cane.

Prevalence of Grubs During Recent Years.

The next three years (1913 to 1915) saw a run of good seasons, which enabled this formidable insect to regain its normal activity, with the result that in 1916 further heavy losses were sustained by our cane farmers.

Its appearance again in alarming numbers during the 1920 to 1921 season doubtless resulted from a record rainfall of 19.01 inches registered in the district of Cairns during June to October of the latter year (1921).

The following season was marked by a decided decrease in the number of beetles, which, having since that date encountered drought conditions lasting from 1923 to 1926, have been unable to increase to a dangerous degree. During 1923, however, the pest managed to rally slightly (see accompanying diagrammatic sketch), but since that date has given little or no trouble in the Cairns district. Readers are advised to refer to my November report, in which the climatological control of this cane beetle during the period of 1921 to 1925 is more fully described (see "Queensland Agricultural Journal," vol. xxvi., pp. 478, 489).

It appears, from available data extending over the past twenty-four years, that heavy annual rainfalls are not, as some growers imagine, invariably followed by serious grub infestation; such outbreaks of this pest being usually determined (as already pointed out) by the quantity of rain chancing to fall during the period occupied by its pupal and beetle conditions.

For instance, little difference occurred between the rainfalls for 1912 and 1915 (55.26 and 44.97 inches respectively), and yet, as will be noticed by referring to the accompanying diagram, grubs were far more numerous during the latter year.

Comparing the infestation in 1917 with that of 1918, we find that, although the rainfall in the latter year was heavier (69.18 inches), the pest was far more in evidence during the preceding season (1917), in which the annual precipitation was 66.41 inches.

Similarly, in 1923 the rainfall was 52.55 inches, as against 64.70 inches received during 1922; it will be seen, however, that the grubs gave more trouble in the former season (1923).

Grub Infestation for the Season 1926-1927.

Unfortunately we have experienced favourable climatic conditions for the increase of cane beetles during the past twelve months, with the result that the pest has been able to multiply in sufficient numbers to cause more injury this year than was possible last season. Reports have reached this office to the effect that grubs are at present causing noticeable damage on cane farms situated in various portions of the Cairns district, the general impression being that such injury is more widely spread than was the case last season.

This increased activity of the pest has been induced chiefly by the occurrence of unusually wet weather throughout its egg and early larval stages (November, 1926 to May 1927); during which period 82.37 inches of rain fell in the Cairns district—65 points in excess of the average precipitation for these six months.

Again, although adverse climatic influences occurred during its pupal state in 1926 (June to October), these were not severe enough to materially check the increase of cane beetles.

Possible Cane Grub Infestation during 1927-1928.

I regret to state that up to the present the season has proved very favourable to the development of our grub pest; and, in the event of normal or average rainfalls being registered during the coming months of July to December 1927, we may look forward to an outbreak of this pest of much the same magnitude as that which occurred in the year 1916.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Combating Wireworms.

The larvæ, or so-called “wireworms,” of some of our Elaterid beetles (known commonly as “skip-jack” or “click beetles”) cause considerable injury at times to newly planted cane sets by eating out the eyes or sprouting buds, or killing the succulent young shoots by boring into same below ground level.

The pest in question is a pale-yellow, shining, firm-bodied larva, reddish yellow at each end, and about three-quarters of an inch long by one-sixteenth inch in thickness. When handled it wriggles and slips easily from between one's fingers. The beetle, which is of a dull slaty-brown colour, and about half an inch long by one-eighth inch greatest width, sometimes flies into houses on dark nights, attracted by lamplight, and if laid on its back on a hard smooth surface quickly jerks itself with a distinct click into the air, usually contriving to come down on its legs.

Some of the following methods of combating the larval form of this pest will doubtless interest Queensland cane-farmers, and should be well worth a trial in badly infested canefields:—

(1) See that the land be thoroughly worked and well drained.

(2) Plough deeply, and at the same time collect as many wireworms as possible by hand before planting the crop.

(3) Use organic manures; increase the humus content of infested soils by the use of green manures, &c.

(4) Fumigate the land with calcium cyanide granules or with benzine. The best procedure in such cases is to prebait the soil with seeds of cowpeas or Mauritius bean sown in drills about 3 feet apart, and before the weather becomes too warm for wireworms to thrive in the upper layer of soil. The object of these baits is to induce the larvæ to congregate amongst the germinating seeds, the tender sprouts and shoots of which are very attractive to them. A few weeks later, when the majority of the worms have found the bait, the drills should be treated with the fumigants above mentioned. The calcium cyanide is applied at the rate of about 100 lb. per acre, while about 22 gallons of benzine would be required to treat a similar area.

(5) Strew poison-baits along the bottom of furrows ploughed at regular intervals; a good formula is:—Bran, 25 lb.; paris green, 1 lb.; nitrobenzene, ½ oz.

Other baits or trap-plants used are sliced carrot, rice-bran roasted dry and moistened with water, and potatoes cut on one surface and set in the soil a few inches deep and 10 feet apart; a piece of stiff wire piercing the tuber and showing above ground serves to indicate position of the bait. Remove the potatoes a week or ten days later, dip in a bucket of boiling water, and replace in the soil.

(6) Intensive cultivation of affected land is highly recommended as a controlling agent against this pest; stir the soil as often as possible.

Grasshoppers on the Warpath.

As foretold in “Hints” for last month (May) grasshoppers bid fair to be troublesome during the present month, owing to favourable conditions having obtained during the egg and early larval stages of growth.

For approved methods of controlling this insect the reader is referred to the “Australian Sugar Journal” and “Queensland Agricultural Journal” for last month.

Caterpillars in Evidence.

The present season is proving very favourable to the development of “army worms,” “grass caterpillars,” and the larvæ of “cane skippers.” In the March issue of the “Australian Sugar Journal,” vol. xviii., p. 741, and “Queensland Agricultural Journal,” vol. xxvii., pp. 275-276, recommendations are given for fighting such lepidopterous larvæ. It is interesting to note that caterpillars of the butterflies *Melanitis leda* and *Padraona marnas* appear to be slightly on the increase, and during the last two seasons have been responsible for noticeable although not serious damage to young cane-leaves.

Parasitic Fungus of Cane Grubs.

During this month growers will probably notice cane grubs killed by the so-called green muscardine fungus (*Metarrhizium anisopliæ*). When attacked by this vegetable parasite the body of the grub, instead of decomposing, retains its original shape, and after hardening turns at first white and then an olive-green colour, the latter condition being the fruiting stage of this fungus and consisting of a thin crust formed of chains of spores. Weather conditions up to the present, however, have not been favourable to the development of this useful fungus parasite.

Tachinid Parasites now Ready.

Specimens of this parasite of the cane borer are now ready for distribution. Growers requiring same are asked to apply to the Entomologist at Meringa for consignments of these tachinids, which will be released free of cost by the Sugar Bureau on areas affected by the weevil borer.

RED ROT DISEASE.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (5th July, 1927) from the Assistant Pathologist, Mr. E. J. F. Wood, relative to Red Rot disease in cane in the Sarina district, near Mackay.

During the last few years the disease known as Red Rot has sprung into prevalence in the Sarina area, and has caused damage as great as that caused by such serious diseases as gum, so that we must cease to consider it as a disease of minor importance in this State. The evidence of the farmers goes to show that it has been in the district for years past, but was disregarded, as it was considered of little importance. During the last three years the disease has increased both in extent and virulence, and has caused grave losses to both the farmer and the miller by lowering the density by as much as eight units, and also by loss of crop.

The disease shows up only towards the crushing, and at present only isolated cases could be found. This prevents the damage from being estimated till about crushing time, but then the disease suddenly becomes virulent, and the cane goes off before the farmer realises it or has time to get it cut and sent to the mill. If the mill were able to estimate the affected areas, some provision might be made to get this part of the crop in at the beginning of the season, and thus minimise the loss.

Symptoms.

When the insidious fungus at first attacks the cane, the stool appears normal, and you may chance to find an affected stick by breaking at random through the field. The chances are small. This stick will, on slicing it lengthways, show a reddish discoloration with white pithy spots. These are the definite symptoms of the disease as seen in the field. Later on, the cane will die wilting and rotting, but it is usually cut at a slightly earlier stage. The cane comes to the mill with the butt-end and a good part of the rest of the stick in a half-fermented condition, and is almost useless for milling.

Cause.

The cause of the disease is a fungus, *Colletotrichum falcatum*, which is what is known as a facultative parasite. This means that it lives on the trash and old cane stools, but given the right conditions it can attack the cane when it is living and lives on the juices thereof. The spores or fruits can be carried on the trash and the fungus itself can be transmitted in the cuttings. There may be, also, other forms of transmission which could be proved by experiment. Horses and implements infected with the spores would be able to carry the infection from field to field. Whether this is important is yet to be proved in this district.

We have then the important facts:—

(1) Cuttings carry the disease.

(2) Any trash, leaves, or old stools carry the disease.

(3) The disease arises from some weakening of the cane plant due to external causes, before the fungus is able to enter its host.

A conspicuous example of this was seen by me in Clark's Seedling at Sarina, where the Red Rot symptoms were showing just below the longitudinal cracks in the rind, which are so often present in this variety; the cane was lying over, and no disease was to be seen in the standing cane. It is this fact that gives rise to the opinion that the disease often appears in the plant cane, and not at all, or to a lesser extent, in the ratoons.

The control of the disease naturally falls into two divisions:—

Firstly, with regard to the cane itself. This means attention to the plants. Never plant from any field which has suffered from Red Rot, and never allow anyone else to plant from your infected field. It is useless to plant in a field which has been infected unless precautions have been taken to get rid of the infection. You may find that the field is healthy, but it is a matter of luck.

Secondly, with regard to the field. This is most important. Many farmers are of the opinion that with the return of good seasons the trouble will disappear, but though it may be lessened for a time there is no surety that it will not return. The presence of the disease so early shows that there is still a good chance of its recurring even this year. The only sure way to get entirely rid of it is to cope with the field. I should, therefore, suggest tentatively a programme somewhat after the following:—

(1) All trash and rubbish should be burnt, and the stools broken up.

(2) The addition of lime to the soil, preferably burnt lime, in order that the soil reaction may be upset with the hope that the fungus will be inhibited.

(3) The draining of the low-lying pockets.

(4) The planting of green manure crops in order to add nitrogen and other elements to the soil, to smother weeds, and to assist the degredation of the old stools.

(5) The analysis of soil in order to find out what is lacking, and the restoration of the deficient elements to the soil in the shape of a correct fertilizer.

(6) The interval before replanting a diseased field should be as long as possible. If you have enough ground it will be well to let an infected field go out for some years. Plant your clean field with clean seed or you might as well leave it alone.

Much research remains to be done in connection with this disease before all the means of transmission are known, but the above recommendations are intended as a practical and payable method of alleviating the trouble, and should, in fact, absolutely control it if adhered to.

THE JOURNAL A VALUABLE GUIDE.

An Oxley farmer writes (15*th June,* 1927):—"*When first I subscribed to your Journal in* 1914, *at Raglan, Rockhampton, I was what you term a 'greenhorn farmer,' although a Queensland native. I look forward each month for my copy of the Journal, as it is a valuable guide to me, and I could not carry on without it now, as it guides me from month to month what and how to sow and plant; also how to use fertilizers, all of which one can gather from the Journal or a leaflet on fertilizers.*

"*I have not had a failure yet by following the instructions. I have already planted out* 2,000 *cabbage plants, and land and plants are ready now for* 5,000 *more, and thanks for the Journal and information, I am making a speciality of cabbages alone, and have just had erected an irrigation plant to cope with the watering of these plants in the summer time. I have the latest spray—just like rain. I intend going in for* 5 *acres of cabbages as I keep getting the land ready, and many thanks to your Journal again.*"

DENHAMS

LIMITED

Roma Street, Brisbane

Manufacturers of Chick, Calf, Cattle, and Pig Foods

The Formulas, as required by "*The Stock Foods Act of 1919*," have been deposited with the Department of Agriculture and Stock.

We invite you to compare the ingredients, also Analyses of Foods, with other Stock Foods on the market. We confidently assert our Foods are better value.

CALF FOOD

Ingredients Wheat Meal, Pollard, Oat Meal, Barley Meal, Maize Meal, Linseed Oil Meal, Meat-Bone, Blood Meal, Cod Oil.

Analysis Crude Protein: Min., 15%; Crude Fat: Min., 5%; Crude Fibre: Max., 7%. **Price**—21s. per 100-lb. bags; 11s. 6d. per 50-lb. bags; 6s. per 25-lb. bags.

GROWING MASH

Ingredients—Wheat Meal, Bran, Pollard, Barley Meal, Rice Meal, Maize Meal, Linseed Oil Meal, Meat-Bone, Blood Meal, Salt, Sulphur.

Analysis—Crude Protein: Min., 15%; Crude Fat: Min., 4%; Crude Fibre: Max., 4%. **Price**—14s. per 100-lb. bags.

LAYING MASH

Ingredients—Wheat Meal, Bran, Pollard, Barley Meal, Rice Meal, Maize Meal, Linseed Oil Meal, Lucerne Meal, Meat-Bone, Blood Meal, Salt, Sulphur.

Analysis—Crude Protein: Min., 20%; Crude Fat: Min., 6%; Crude Fibre: Max., 9%. **Price**—12s. 6d. per 100-lb. bags.

CHICK FOOD

Ingredients—Wheat kibbled, Maize kibbled, Linseed Oil Meal, Meat-Bone, Blood Meal, Japanese Millet, Panicum.

Analysis—Crude Protein: Min., 14%; Crude Fat: Min., 6%; Crude Fibre: Max., 4%. **Price**—16s. per 100-lb. bags; 8s. 9d. per 50-lb. bags

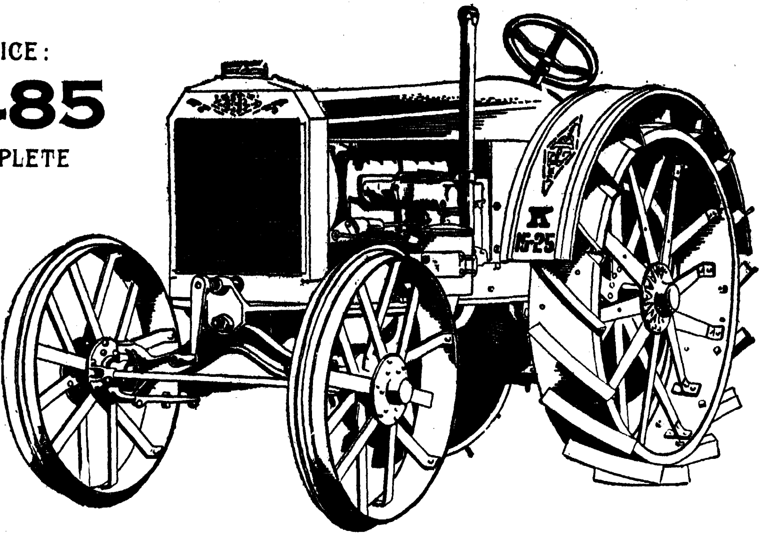
Barley Meal, £10 5s. per ton.
Maize Meal, £10 per ton.
Protein Meal, £14 per ton.

FARMERS!

You will need a man-size tractor this year

PRICE:
£485
COMPLETE

"The
King
of
all
Tractors."



E-B 15-25 Farm Tractor is the most economical Tractor in the World for draw bar pull. 10 years of dependable farming. Write for specifications and terms.

ESTABLISHED 1900

AUBURN
CARS

OFFER BETTER VALUE FOR 1927 THAN ANY OTHER AUTOMOBILE COMPANY

So sure are we that it will exceed anything that you have ever experienced before, that we invite you to test it. If it does not sell itself, you will not be asked to Buy.

COMPARISON PROVES

NOREMAC MOTORS LTD.

MAKERSTON STREET, BRISBANE

FIELD REPORTS.

The Northern Field Assistant, Mr. A. P. Gibson, reports (12*th July,* 1927):—

HERBERT RIVER.

The Herbert River sugar land is alluvial and different from the more northerly areas; it extends many miles along both banks of the river and is wondrously fertile in parts.

At the beginning of the month the weather included days of sparkling sunshine followed by rain; such conditions frequently occur in the Northern winter.

Rainfall—	Ingham. Inches.		Halifax. Inches.
January	31·11	..	31·77
February	36·28	..	40·14
March	8·59	..	7·53
April	5·55	..	2·50
May	1·58	..	0·80
June (to 15th)	3·91	(to 11th)	2·57
Total	87·02	..	85·31

Particulars of past season's crop are interesting and are as follows:—

Macknade Mill—

Season commenced, 22nd June; finished, 11th December.

Crushed 158,477 tons for 21,414 tons sugar.

Average tons cane crushed weekly, 6,468.

Average price per ton cane paid, 47s. 4·8d.

Average price per ton cane paid to cutters, 8s. 7d.

Victoria Mill—

Season commenced, 12th June; finished, 4th January.

Crushed 167,040 tons for 21,578 tons sugar.

Average tons cane crushed weekly, 5,377.

Average price per ton cane paid, 42s. 5·1d.

Average price per ton cane paid to cutters, 8s. 9·3d.

Total tons cane, 325,517 tons for 42,992 tons sugar.

Varieties.

Many varieties were noted. Below is given a complete list, coupled with the percentage of each grown in the two mill areas.

Variety.	Percentage Grown at Macknade.	Percentage Grown at Victoria.
N.G. 15 (Badila)	38·7	46·2
H.Q. 409	35·4	28·0
Goru Family	4·6	12·2
Korpi	10·9	2·0
Q. 813	3·7	5·2
H.Q. 426	0·4	2·0
Orambo	0·9	1·5
M. 189 (Black Innis)	0·9	1·3
Nanemo	1·2	0·8
7 R. 428 (Pompey)	0·4	0·8
M. 1900	0·3	—
Mixed	2·6	—

Flood Damage.

Lack of rain during the growing period and unusual frosts severely affected last year's crop. Those, however, whose memories encompass fifty years cannot recall anything to equal the rain which took place in February of this year, followed by a disastrous flood which occasioned great all-round district losses. Some farms were very badly washed, holed, or heavily sanded, and parts temporarily or permanently ruined in so far as cane culture is concerned. Other farms benefited by the enormous quantity of valuable silt deposited upon them. Nut grass was transported by water to new areas; this is a source of annoyance in germinating cane paddocks, but may be regarded as a blessing in disguise for it makes farmers cultivate. Crops had badly shot or perished where they were long and deeply submerged, since most of this had been ploughed and re-planted. Tractors have taken the place of lost horses on many farms. The farm and crop damage, although severe in isolated parts, is now generally determined to be considerably less than was first reported. Had this crop reduction not occurred it is questionable whether the two local mills could have fully milled the seasonal output. The increased number of bridges spanning the many waterways became fouled by the enormous quantity of débris, and in conjunction with railroad embankments prevented the flood water getting away quickly. Enormous river bank erosion has taken place, and everything possible should be done to stay this; the encouragement of river bank plant life would help.

The Crop.

Perfect weather conditions have prevailed from a cane planter's point of view since the February floods. In consequence, the cane has made a wonderful recovery, and a good crop is now assured. At the present moment this is forecasted to yield 320,000 tons—5,000 tons less than 1926. The area has been well soaked by recent rains, therefore the continuance of good growth seems assured for some time to come.

Harvesting.

There is generally a distinct dry period extending from June to December, when harvesting and planting operations are safely accomplished. Victoria commenced crushing on 3rd June, and Macknade on the 15th. From the outset, field and mill work appeared to proceed smoothly. A big percentage of the crop had fallen, but was said to be weighing well. Soiled cane (the effects of flood) yields a muddy juice, and of course, requires more filtering. Satisfactory crops of most varieties grown were noted throughout the big area. Here it is common to cut from the plant and two ratoons.

Labour.

This is plentiful for all requirements. Seventy-three gangs were operating, comprising some 620 harvesters (all foreigners).

Soils.

These differ much in colour, texture, and quality, according to deposition at time of the many past inundations. Lime, more surface draining, and the restoration of lost vegetable matter would improve the texture and subsequent crops.

Planting.

This season was perfect for planting, consequently a satisfactory germination of the early planted crop is seen over the greater portion of the No. 1 division. Cane rows are commonly made by a big drill plough, being 10 to 12 inches deep, with interspaces varying from 4 feet 6 inches to 5 feet. The seed is very thickly deposited, soil covered by scarifier, and frequently followed by different kinds of home-made soil packers. The plant cutting waste should be removed from the fields. The popular varieties being planted are N.G. 15 (Badila), Korpi, Orambo, Q. 813, and H.Q. 409.

Diseases and Pests.

This area appeared the least diseased in the whole of the No. 1 division. The judicious elimination of the one-time popular but severely gummed H.Q. 426 variety, coupled with improved plant selection methods, has in no small degree been responsible for its now almost gum-free condition. What has been achieved here can be accomplished elsewhere by more careful plant selection and greater co-operation between farmer and the mill field men. Planters here have been well schooled; they realise the value and benefit of expert advice.

Shoot killers, wireworms, *Pentodon Australis* (black beetles), and innumerable black ground crickets were present. The latter attack the plant ends and the growing point of primary plant shoots. A great many brown and green medium-sized frogs were observed amongst the cane foliage. Scanty fungus abundantly seen. Weevil borers not plentiful.

Railroads.

Where the traffic is heavy 45-lb. rails are replacing lighter ones. About a mile of new line (45-lb. rails) is being constructed, and when completed will permit cane trains going direct to the factories instead of passing through the main thoroughfare of Ingham.

Long Pocket and Elphinstone Pocket have suffered severely from the flood. The river bank soil of these places is dark, fertile, rather wavy scrub land; back from this is found a medium quality cohesive to sandy forest soil. Much of it is still densely covered by bloodwood, broad-leafed wattle, Moreton Bay, pandanus, and supple jack. This land would cost some £40 per acre to put under cane. Most of the tilled soil had been washed out in parts; in one instance the plough or hard pan soil had been worked up and planted; the seed had germinated favourably. It will be interesting to watch this field's progress. Prior to the memorable February flood it was computed that the nine farmers in this fertile Elphinstone Pocket would cut 14,000 tons, but it is now forecasted to yield only 1,600 tons of cane. Poor, half dead flooded cane was being unwisely planted in this area.

TULLY.

It may be said that Tully is the newest and most progressive sugar area in the North, in so far as the progress of the town and district is concerned. Those responsible are deserving of much credit. There remains much to be done to make the surrounding roads passable at all times; the cost of this valuable work is greatly increased by adverse weather conditions.

Rainfall.

147.78 inches of rain had fallen up to the 23rd June, as follows:—January, 34.58 inches; February, 65.65; March, 14.40; April, 22.67; May, 4.12; and June (to 23rd), 6.36.

The Crop.

The crop in general had improved wonderfully since my last inspection. It possessed a particularly fine, healthy colour and was growing with amazing speed. Ninety-eight per cent. or more of the crop is N.G. 15 (Badila). This is one of our finest harvesting canes, the foliage although plentiful offering little resistance, therefore it is expected that the loaded cane trucks would be dispatched to the factory reasonably clean. Unfortunately, this is not the case. Prolific crops somewhat recumbent and low in quality are being harvested, 30 to 40-ton crops are common, and 65 or more tons per acre at present are being harvested. This high tonnage speaks for the fertility of some of the Tully cane soils. As time goes on the soil fertility will be reduced when smaller but richer crops will be produced.

Milling.

The big factory is now doing the daily work expected. The cane supply is improving. This has been inadequate to keep the big plant fully operating; 60 tons per hour are sometimes milled. One week 6,787 tons were treated, and something like 25,000 tons were treated by the 26th June. This is quite a satisfactory beginning. Permission has not been given to burn much cane so far. A large quantity of trash is coming forward with the harvested cane. Anything that reduces efficiency and raises the cost of production should be avoided. Trash is a high moisture absorbent material; when compressed it yields its water into the expressed juice, thus lowering the quality besides increasing the bulk to be treated by the factory. The mill estimate stands at 180,000 for the present. Much of the cane harvested after Christmas is naturally backward, and, of course, may not be cut. However, should the cane continue to grow throughout the winter as at present, the given estimate may easily be eclipsed.

Pests and Diseases.

Grubs have been operating on several Lower Tully River farms; they have gone down into the soil to hibernate. Fresh roots and shoots were again forming in the less affected stools. Weevil borers noted, being more numerous in the big traffic cane. Leaf hoppers and midrib borers were abundantly seen. Rat destruction observed. The interested growers should at once co-operate and endeavour to stay the progress of this most destructive pest. This area contains many heavily grassed water-ways which are excellent breeding grounds and jumping-off places for this undesirable pest. Leaf Scald, Spindle Top, also a little brown rot noted.

INNISFAIL.

Rain and the almost impassable nature of the district roads prevented me inspecting much of the district.

Rainfall.

June, 10.96 inches; total for the year 117.15 inches. Continuous wet weather is having an ill-effect on field work in general. This in its turn is seriously reducing the factories' cane supply brought about by the great difficulty experienced in hauling out the loaded trucks from fields to permanent way. Light crops of rather low quality seemed to be a common complaint. This may be attributed to wind and water damage, and now overmuch rain. Naturally the damaged cane is being harvested first. A very long stretch of sunny weather at an early date is required to bring about an all-round improvement. The crop seen has a good colour, but has not made the progress expected. Spindle Top or Needle Top is widespread, and in no small degree reduces the quality and retards growth. This condition is caused by a fungus which binds the sheath to stem, and causes more destruction during the wetter seasons. Weevil borers are working strongly on cane trashed along No. 6 branch, South Johnstone, for fire break.

The Southern Field Officer, Mr. J. C. Murray, reports for the period 15th May to 15th June:—

BEENLEIGH.

In the course of the month, work has been carried out in the Beenleigh and Bundaberg areas. It is very satisfactory to note that the canegrowers are taking, year by year, a greater interest in the work of the field staff and the Bureau generally, and realise that the field officers can be of real and tangible benefit to them, and that they have a more important function than merely writing reports. The following details summarise conditions:—

There are several very fine blocks of cane in this district, mostly Q. 813 and H.Q. 285. The growers are advised to plant these varieties entirely because they show, so far, a greater degree of resistance to Fiji disease than the other canes. Quite apart from disease, however, these two canes are well suited for the Beenleigh district. The writer does not intend to discuss Fiji disease in this report, as the Pathological staff are working on this cane malady and the attention of canegrowers is directed to the work of these gentlemen on the subject, some account of which is published in this issue of the Journal.

Farmers in this district are recommended to do more green manuring and liming experiments than they are at present doing. They are also recommended to try and carry out local experiment in relation to the value of fertilizers. It is to be borne in mind, however, that commercial fertilizers have little value for restoring a worn-out soil if, as is very often the case, the texture of the soil and not the chemical content is at fault. They are of far greater value after the soil has been put into good condition by green manuring or the addition of animal manures. However, the local experiment plot is the factor that will conclusively determine manurial values. It can be carried out in the following way:—Let a grower take an acre of soil and divide it into ten blocks. That will mean that each block is 2 rods wide and 16 rods long. On No. 1 block he can try 16 lb. of nitrate of soda, on No. 2 16 lb. of sulphate of ammonia, on No. 3 32 lb. of superphosphate, on No. 4 16 lb. of sulphate of potash, on No. 5 16 lb. of nitrate of soda and 16 lb. of sulphate of potash, on No. 6 16 lb. nitrate of soda, 16 lb. of sulphate of potash, and 32 lb. of bonedust; on No. 7 stable manure; on No. 8 nothing; on No. 9 2 cwt. of crushed limestone; and on No. 10 16 lb. of sulphate of ammonia, 16 lb. of sulphate of potash, and 32 lb. of meatworks.

He can then compare his unmanured block with his manured ones and obtain the value of his fertilizer results (if any) by the following calculation:—Subtract the unmanured tonnage from the manured, multiply result by net price of cane at the mill, and subtract from that cost of fertilizer and labour.

BUNDABERG.

In the Bundaberg district the cane generally has made good growth. Since Christmas the appearance of the cane has undergone a complete metamorphosis and now the growers can, almost without exception, point to a good crop. It is seldom that a finer exhibit of cane comes to the local agricultural show than did this year.

Slight frosts have been experienced during the past month, but no harm has been done to the crops. Some farms show considerable crop reduction through root rot. There is no evidence at present that gumming disease is going to cause appreciable losses in this district. Badila cane that was badly affected last year in some parts of the district is, so far, showing nothing (not even where the cane was very bad) of the disease this year.

More fertilizing is being done in this district than has been carried out previously. Complete manures, with the principal part sulphate of potash, are being more used than any other. For the canegrowers' information it can be pointed out that there are two classes of manures, ''complete'' and ''incomplete.'' A complete fertilizer contains all three of the essential plant foods, while an incomplete fertilizer contains but one or two. It can be easily observed that local experiment on lines laid down earlier in this report is all-important if the grower of cane wishes to obtain accurate data.

There is another matter about which farmers require to be careful, and that is the haphazard introduction of varieties. Now, while it is an excellent plan to experiment with canes, there should always be a special plot kept for this purpose at least three chains away from the principal crop. Say, for instance, a farmer introduced a cane with a disease, and planted it with his staple crop, it does not require much imagination to work out the damage he would be doing. The writer would suggest that each grower of, say, 25 acres should set aside 2 acres, one for fertilizer experiment and one for varieties. A cane requires about six years' trial before grower and miller are clear on the following points:—

(1) Striking properties.
(2) Early growth properties.
(3) Maturing periods.
(4) Standover properties.
(5) C.C.S. value.
(6) Milling qualities.
(7) Cutting and handling qualities.
(8) Disease-resistant qualities to major diseases:—
  (*a*) Mosaic, (*b*) gumming, (*c*) root rot, (*d*) leaf-attacking fungi.
(9) Root system. (Upon the root development of the cane depend the methods of fertilizing.)
(10) Resistance to grubs and earth parasites.
(11) Resistance to drought.
(12) Resistance to frost.
(13) Class of soil variety likes.

The last and the third points are of great importance, as very often through insufficient knowledge of these a valuable cane is discarded.

The Central Field Assistant, Mr. E. H. Osborn, reports for the period 14th May to 13th June:—

MACKAY.

Up to time of writing (22nd June, 1927) the following figures represent the local rainfall:—January, 11.00 inches; February, 8.47; March, 18.44; April, 2.07; May, .54; June (to 13th), 2.79. Total, 43.31 inches. A glance at these figures shows that up to the end of May the fine aggregate of 40.52 inches had been registered, and the further bountiful fall of 2.79 inches early in this month is just what the district needed to ensure the success of the present season's crop, and also to give a great impetus to the late planted cane.

Mirani to Mia Mia.

Six farms were visited, the soil in most places being a very medium greyish forest loam, formerly carrying poplar gum, &c. On these soils, where they had been well ploughed and not merely scratched, liming and fertilising had improved the stand of cane marvellously; one 8-acre paddock of Q. 813, which had been so treated, was noticed to be carrying a beautifully even crop which will probably cut some 30 tons per acre.

The only disease noticed among these farms was Mosaic to a heavy extent in some plant Innis (M. 189) and grown from seed obtained from the Finch Hatton district. The owner is, however, ploughing it out after harvesting.

Mia Mia.

Some really good country was seen on both sides of the river, which runs roughly in a northerly direction. On both sides of the river, but seemingly to a larger extent on the western bank, are some exceedingly rich deep alluvial flats capable of growing splendid crops of cane. Varieties noticed to be growing most vigorously—Q. 813, M. 1900, N.G. 15, H.Q. 426, Gingor, Malagache, D. 1135, 7 R. 428 (Pompey), and E.K. 28.

As usual the favourite canes are Q. 813, H.Q. 426 (Clark's Seedling), and M. 1900, for a grower can usually be assured of good average density returns from these varieties when cut at the right times.

Some fine crops of Gingor were also seen both on the alluvial land and upon the poorer forest soils. As for E.K. 28 several fine crops were noticed; one October planting upon alluvial soil would probably give a 40-ton crop now, but it is probable that on such good soil the density would be inferior to the same cane on a poorer class of land.

Grubs.—Several farms adjacent to the river were infested with this pest. On one property a block of D. 1135 was planted alongside some N.G. 15 (Badila) with a block of M. 1900 just over the headland. The D. 1135 was growing most luxuriously, being absolutely green and healthy looking, while the N.G. 15 and M. 1900 were both heavily infested and were lying down in most places.

Disease.—On a farm on the eastern side of the river, Mosaic was very bad in a small block of first ratoon Malagache, but this will be ploughed out after harvesting. Nearby, a few stools of D. 1135 first ratoon were affected, but this is also to be ploughed out.

Near Mirani the only disease observed was Mosaic in some luxuriantly growing second ratoon Black Innis (M. 189), and in a few odd stools of first ratoon M. 1900. The Innis is to be ploughed out after harvesting. The M. 1900, however, is planted adjoining another farm which is carrying a heavily infected crop of H.Q. 426 plant cane. Adjoining this latter crop is a paddock of young plant H.Q. 426, which now shows Mosaic marking much more freely than it did a week or two earlier.

Cane-killing Weed.—A solitary specimen of this weed was found on the roadway near Mia Mia, and led to inquiries from farmers thereabouts, who formerly suffered cane losses, whether it was now doing any damage to the crops, but they all replied in the negative.

Farleigh (Adjacent to River).

A few days were spent in this vicinity, principally on the lookout for Mosaic, and of ten farms inspected the disease was found as follows:—

Number Farms.	Variety.	Degree of Infection.
1 farm	Plant H.Q. 426	Slight
1 farm	1st Ratoon M. 1900	Slight
1 farm	1st Ratoon M. 1900	Very slight
1 farm	1st Ratoon M. 1900	Bad
1 farm	Plant M. 1900	Very slight
1 farm	2nd Ratoon Innis	Slight
1 farm* ..	Plant Cheribon	Very heavy
	Ratoon Cheribon	Very heavy
	Plant M. 1900	Very heavy
	Plant D. 1135	Slight
	Plant E.K. 28	Slight

* As will be seen above, this farm is heavily diseased, but seemingly has a clean crop of young M. 1900 plant, and also in another part of his farm a block of H.Q. 426 looked very fair so far.

Between Eimeo road and Miclere eight farms were inspected, and Mosaic noticed as follows:—

Number Farms.	Variety.	Degree of Infection.
1 farm	Plant Cheribon	Slight
1 farm	Plant H.Q. 426	Very slight
1 farm	Plant Innis (M. 189)	Slight
1 farm	1st Ratoon Malagache	Heavy

In two farms adjacent to the Hills, grubs were showing up slightly.

Diseases.—Red Rot in E.K. 28 plant was noticed upon two Eimeo road farms to an appreciable extent, and in each case upon the poorer portions of the paddock.

When the first ratoons from which these plants had been obtained were inspected, the disease was noticed to be much in evidence.

Control measures were outlined to the growers, including ploughing out after harvesting, liming, and green manuring, and then planting another variety (say Q. 813) in this particular paddock, afterwards returning to E.K. 28 if so desired, and Q. 813, which has not shown Red Rot symptoms.

Liming and green manuring are advocated, as experience indicates that the fungus does not damage in acid soils deficient in humus.

The Central Field Officer, Mr. E. H. Osborn, reports for the period 14th June to 13th July:—

Excellent weather conditions prevailed, for the splendid June rains were followed by over an inch early in July. A cold snap followed which should do much to improve c.c.s. values. Crops are looking splendid. There is, also, grass and water in abundance.

Very large areas are being planted throughout the district, the ground in most cases being in very good order. Present indications are that this year's bountiful crop will be followed by another very heavy crop in 1928.

In most cases some really fine sets were being planted, but odd growers still persist in using very inferior plants, obtained from either poorly developed stalks, plants likely to be borer affected, or others that are likely to be diseased. Over and over again the folly of such careless plant selection is pointed out, and it is gratifying to know that in many cases extra supervision now seems to be exercised.

The writer spent a couple of very interesting days inspecting the large crops under the control of the Palms Estate management, and was struck by the well grown crops of plant, and more especially ratoon cane looking vigorous and healthy. Only the very slightest signs of disease could be found in an odd stool, thus speaking much for the care that had been used in plant selection.

In contrast to this, in another instance, a grower was noticed using some beautifully grown H.Q. 426 (Clark's Seedling) for plants, and amongst a dozen or so turned over casually was one noticed with a reddish end which, on being opened, was found very badly bored with the grub in full operation. This grower will probably blame any loss (through faulty strike, &c.) to everything but his own carelessness.

Nearby, notice was taken of a big heap of Q. 813 sets, which showed a far larger percentage of bored plants than even the above grower had.

Varieties.

Q. 813, H.Q. 426, and M. 1900 are easily the most popular in the recently visited areas, and are certainly suited to Mackay conditions, the former especially being planted in larger quantities every year, for it is a cane that nearly always has a very fair density and continues to keep same up when other canes are steadily falling away.

H.Q. 426 is also a wonderfully good cane in the early part of the season, and some nice crops were to be seen. M. 1900, for late cutting, is here very highly thought of, for its tonnage and density are then very fair.

E.K. 28 is also increasing in favour, and will get a good testing this year for it has been planted in many classes of soils, and also at different planting periods.

Some good crops of D. 1135 were also noticed upon the Palms Estate, and upon some of the oldest Racecourse lands. On one of such farms a 35-ton crop was much admired, the owner of same claiming very good c.c.s. values from this variety upon his land, plant cane giving over 16 c.c.s. frequently.

Badila (N.G. 15).—Some extremely fine crops of this cane were noticed growing upon the alluvial flats adjacent to the river, well stooled out cane with good length and thickness of stick. As practically most of this class of land has been under cane for some forty to fifty years without fertilizing, and still yields such good crops, its quality can easily be gauged.

Fertilizing.

The principal manure used certainly seems to be B_3, and growers in most cases claimed good results from it. In connection with either fertilizing or liming it cannot be too much pointed out that where the drainage is deficient neither of these agents can do their best, for good drainage is absolutely essential for satisfactory returns.

Where the grower is doubtful as to his soil requirements he can always obtain an analysis (free of charge) by applying to the Bureau of Sugar Experiment Stations, Brisbane, through their Field Officers, or direct.

In speaking of drainage as referring to Mackay, mention must be made of the seemingly very successful system of two-row 9 feet 6 inch beds as carried out in the Homebush area. During the very wet days in January last the writer visited several of these farms and saw plenty of water in the headland drains, and in some cases in the water furrow, but the cane itself looked beautifully green and healthy, and carrying none of the yellow leaves so often seen in larger row beds, especially upon the outer rows.

Quite a number of growers upon low-lying and heavy soils are now giving lime a trial, and in several cases the limed portions show a wonderful improvement upon the unlimed parts and the texture of the soil much improved.

Diseases.

Mosaic to a very slight extent was found on four farms visited—i.e., one farm, in H.Q. 426 plant, one farm, in H.Q. 426 ratoons, one farm, in 7 R. 428 (Pompey) ratoons, whilst another alluvial farm had it in H.Q. 426 ratoons, M. 1900 ratoons, and N.G. 15 plant.

Red Rot was noticed very slightly in E.K. 28 plant, H.Q. 426 plant and ratoon.

"A MOST PROFITABLE INVESTMENT."

Thus a Norfolk Island subscriber (27th June, 1927):—"I herewith enclose the amount of 5s. in postal note, being my subscription to the Journal for five years—a most profitable investment."

AN INFORMATIVE JOURNAL.

A Bowen farmer writes (29th June, 1927):—"Please find cheque for 5s. 6d. enclosed, being five years' subscription (plus exchange) to the 'Queensland Agricultural Journal.' . . . Without doubt the Journal contains a lot of valuable information which could not be obtained elsewhere."

IF you are thinking of buying a Piano you can't possibly make a definite choice until you have inspected these glorious instruments for which we are proud to be Sole Agents—

BECHSTEIN
GROTRIAN-STEINWIG
RONISCH
LIPP
ECKE
VICTOR
KUHLA
MAXIM
BELLING

FROM this fine range you will surely be able to select a Piano to suit your taste and your purse. If you can't call personally, write for a free illustrated catalogue and learn full particulars of the Prices, Small Deposits, and Easy Terms.

REMEMBER—We have been 74 years in the Piano business—and we only handle Instruments that have indisputably proved themselves to be good under all manner of Australian Climatic conditions.

Every New Piano we sell is fully guaranteed. You don't have to shoulder any responsibility —we do that.

Palings

Established 1853.

BRISBANE
TOOWOOMBA
ROCKHAMPTON
TOWNSVILLE

BRUNNING

BEST FOR BEARING

FRUIT TREES

(True to Name and Healthy)

are planted throughout Australasia. Apples, Pears, Plums, Peaches, Nectarines, Quinces, Mulberries, Oranges, Lemons, etc.

Shipments made to all Parts of the World.

JOHN BRUNNING & SONS

Established 60 Years

SOMERVILLE NURSERIES
SOMERVILLE, VICTORIA, AUSTRALIA

Chicks-Chicks-Chicks

Day-old Utility

Black Orpington and White Leghorns

From World's record laying strain. We are now booking orders for delivery from June to October. £5 per hundred, £2 10s. for fifty, 15s. per dozen; special quote for larger quantities. 10s. per 100 secures booking, freight paid. Instructions for feeding, etc., supplied with every order. Also settings 7s. 6d. Stock for sale. *Square deal guaranteed. Correspondence invited.*

Woodlands Poultry Farm
Beerwah, Queensland

A Complete Service in Fertilisers and Sprays

We can supply all your requirements in fertilisers, sprays, spraying and dusting machines, pest destroyers, etc. We carry the largest stocks in the State at competitive quotations. Prompt efficient service to all orders, large or small. Full information on the fertilisation and spraying of crops gladly given on request.

A.C.F.
REGISTERED TRADE MARK.

FERTILISERS

THERE'S A DIFFERENT
A.C.F.
COMPLETE MIXTURE
FOR EACH CLASS OF CROP,

also—

BONE DUST, **LIME,** **SUPERPHOSPHATE,** **POTASH,** **SULPHATE OF AMMONIA,** **NITRATE OF SODA,** **NAURU PHOSPHATES,** **SULPHUR AND SPRAYS** **OF EVERY DESCRIPTION.**	***Write Now for Prompt Quote.***

AUSTRALIAN CO-OP. FERTILISERS LTD.,
LITTLE ROMA STREET, BRISBANE.

REPORT ON THE FIJI DISEASE SITUATION IN QUEENSLAND.

Parts I. and II. By W. Cottrell-Dormer.
Part III. By E. J. Ferguson Wood, B.Sc.

PART I.

GENERAL DISCUSSION OF FIJI DISEASE, WITH SPECIAL REFERENCE TO ITS OCCURRENCE IN QUEENSLAND.

Fiji disease was first reported as being established in Queensland in 1926, when it was found to be present in the Beenleigh district, some 25 miles south of Brisbane, by Mr. J. C. Murray, the Southern Field Assistant to the Bureau of Sugar Experiment Stations. Later in the same year the disease was recognised by Mr. N. L. Kelly, Assistant Plant Pathologist, in the Maryborough district, which lies 167 miles from Brisbane, on the North Coast Railway.

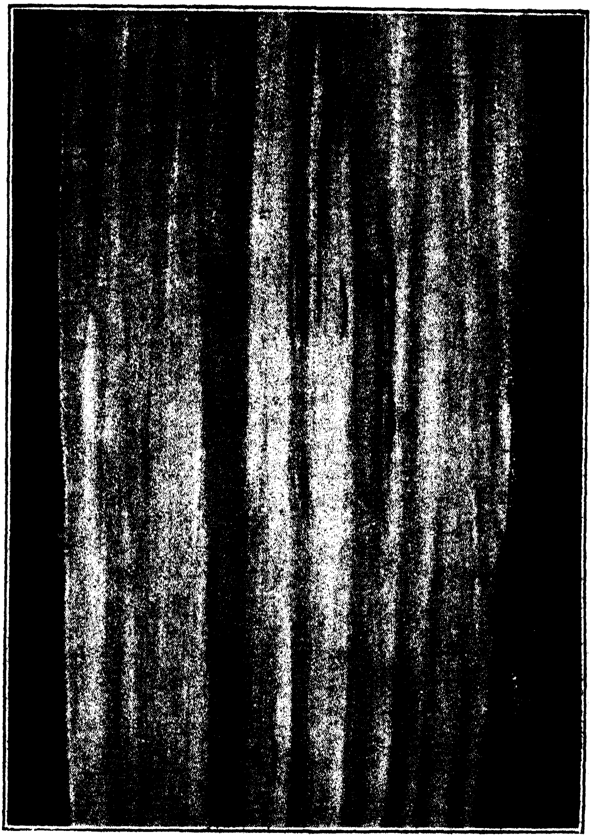


Plate 20 (Fig. 1).—Portion of Leaf of D. 1135, showing Fiji Disease Galls (× 2).

This report is the outcome of investigations carried out by the writer, with the assistance of Mr. E. J. Ferguson Wood, B.Sc., during the month of January of this year. Unfortunately, heavy rains fell during a great part of the time set aside for the work, and it was only with great difficulty that the districts infected could be inspected; in fact, some farms were quite inaccessible owing to flood water. However, sufficient information was gathered to indicate definite lines of attack in each district.

During the month of May a further week was spent in the Beenleigh area in completing the inspection, and in re-examining certain farms with a view to confirming previous observations.

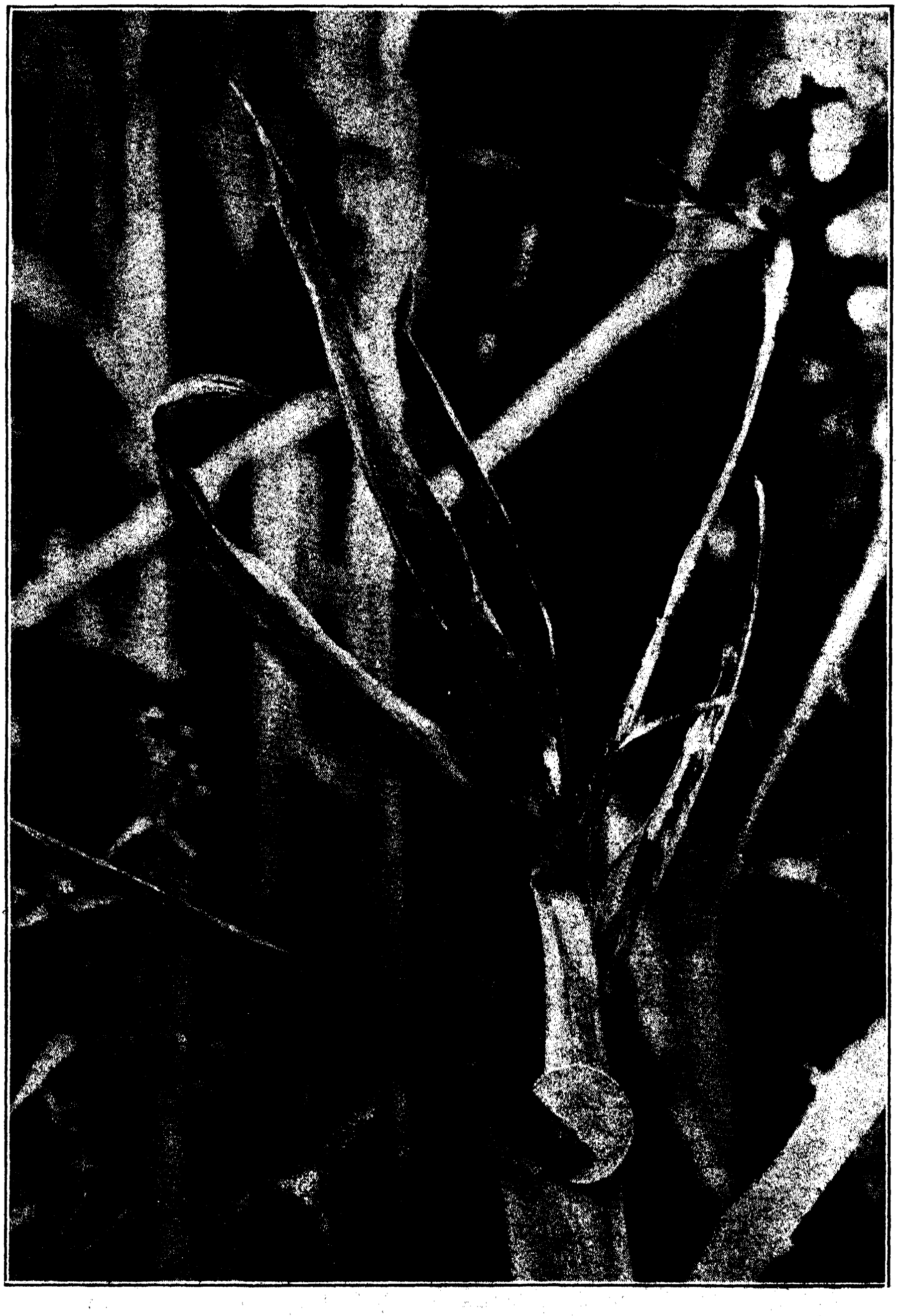


Plate 21 (Fig 2).—A Stem of E.K. 1, showing Typical Symptoms of Fiji Disease.

PLATE 22 (Fig. 3).—SHOWING ADVANCED STAGE OF DISEASE IN D. 1135.

Origin of Fiji Disease in Queensland.

How or whence Fiji disease came into Queensland remains an open question. The lack of records by farmers of introduction of canes into the Beenleigh and Maryborough districts makes it exceedingly difficult to obtain any information in this regard.

As a result of conversations with many of the growers, we think that it is more than probable that the presence of the disease dates back some ten years. It is only because the districts had not been visited earlier by a pathologist that its presence remained unknown to the Bureau for so long.

The History of Fiji Disease.

Fiji disease owes its name to the fact that Fiji is the country in which it was first responsible for severe damage to commercially grown sugar-cane.

The first serious work executed on the subject was due to D. S. North, Pathologist to the Colonial Sugar Refining Company, about the year 1909. At that time the disease was proving a very severe menace to the sugar industry in Fiji, and North carried out very extensive field investigations and soon succeeded in evolving reliable methods of quickly diagnosing the disease in the field. He then found that certain varieties, especially Badila (N.G. 15), were more resistant to infection than others, and that hillside cane gave cleaner seed than lowland crops. With this knowledge he worked out a control scheme which, carried out by the company's field men under his supervision, proved in a few years an unqualified success, and re-established the industry in Fiji. The disease was also present in Australia at this time.

The first published account of Fiji disease came from the pen of Dr. H. L. Lyon (1), of Hawaii, in 1910 as a result of work done in conjunction with North.

In 1914 the disease was discovered in many localities in Papua, by A. M. Carne (1), who was collecting sugar-cane varieties during that year for the Colonial Sugar Refining Company. Since it is quite improbable that the disease had previously been introduced from Fiji or Australia into New Guinea, this has been considered sufficient evidence that the disease was originally introduced from New Guinea to these countries with variety collection.

In 1920 the disease was discovered in the Philippines, where it is still doing damage. Fiji disease is not known to occur in countries other than New Guinea, Fiji, Australia, and the Philippines.

Symptoms of Fiji Disease.

Once the symptoms are known, Fiji disease is probably the easiest of sugar-cane diseases to recognise; no special skill or training is required, and even colour blindness is no drawback in its detection.

This is because Fiji disease has, as was pointed out by North in Fiji when the disease was first studied, one quite remarkable characteristic which is never found in other cane diseases—viz., the presence of galls or lumps on the leaves of affected stalks.

These lumps or galls are longer than broad and are really swellings of the veins or vascular bundles of the leaf. They occur on the under side of the blade and midrib of the leaf, measure from about $\frac{1}{32}$ to $\frac{1}{16}$ inch in width by $\frac{1}{8}$ to 2 inches in length; and are light green, yellow, or brown in colour (see Fig. 1).

The leaves showing these galls are invariably more or less distorted according to the degree of infection. If the infection is recent the leaf will show but one or two galls, will be somewhat shorter than normal, but will not otherwise differ much from other cane leaves.

As the infection becomes older, however (see Fig. 2), it will be seen that the younger leaves are assuming a darker green colour than usual, while galls are more plentiful. The leaf will attain only about half the length of a healthy leaf, though the width will not be altered. The tips of the leaves will be blunt and much curled, and the heart of the stem will be somewhat twisted.

The next stage (Fig. 3) is a very serious distortion of the whole top. Leaves forming now never become anything but dark-green stumps with curled tips, and bear many galls, generally running in lines along what remains of the leaf blade. The heart is very stunted, twisted, and split. A strong tendency for promiscuous shooting of lower buds is also often to be observed.

Frequently a stem will persist in the last stage described until the next crushing season, when it may be cut down; on the other hand, it often happens that the stem dies out altogether (Fig. 4). Whatever occurs, the stem is of little or no commercial value as it is usually very thin and dry.

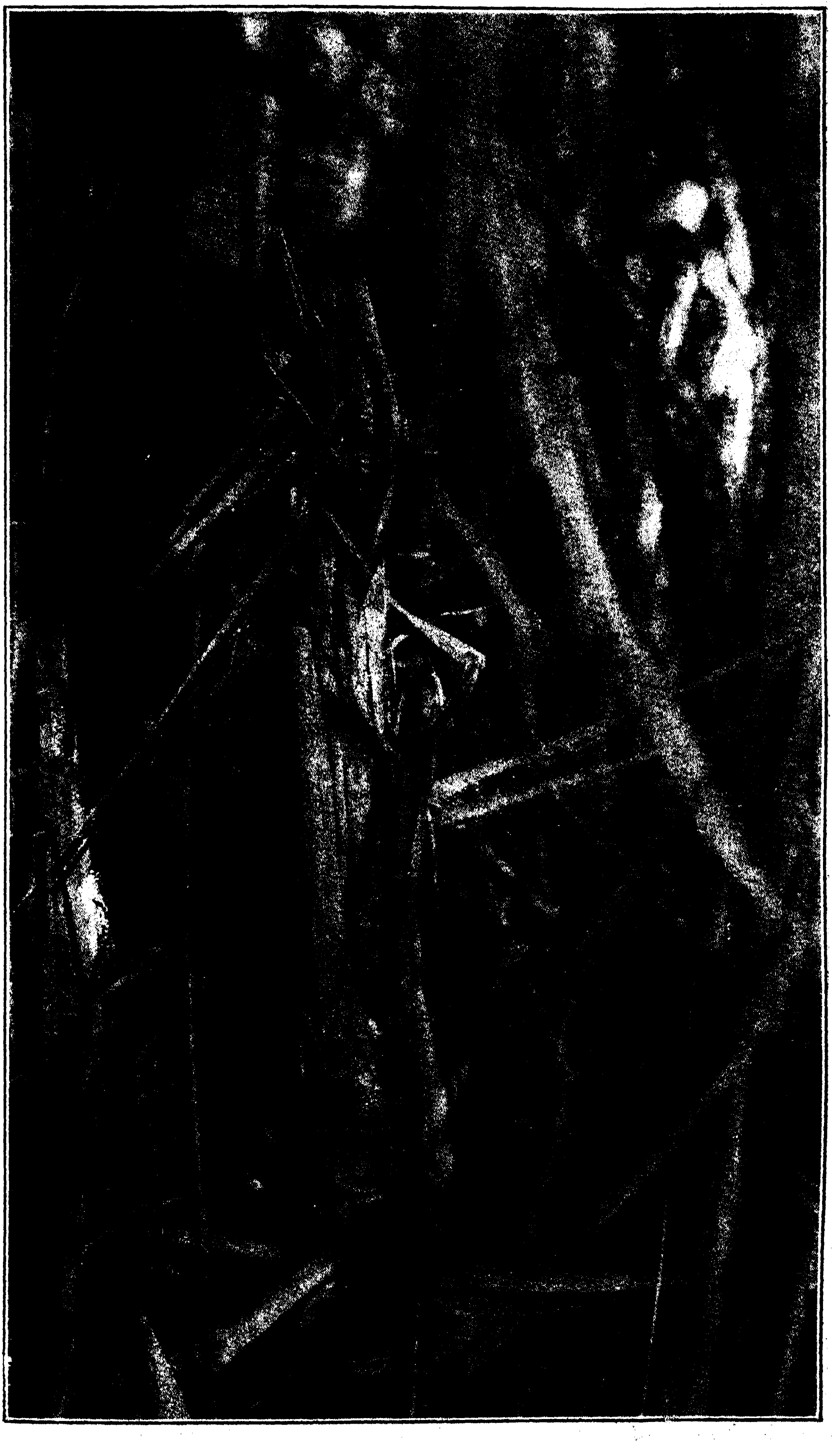


Plate 23 (Fig. 4).—A Stem of D. 1135 Killed by Fiji Disease.
Note promiscuous shooting of eyes.

If the infection has been a secondary one, i.e., if a stool becomes infected after planting, only one or two stems may be badly affected. However, if this stool be ratooned it will usually happen that every stem of the ratoon stool will show infection (Fig. 5). Similarly, if stems be taken from the secondarily infected stool and used for plant cuttings, the stools arising from these cuttings will show serious infection.

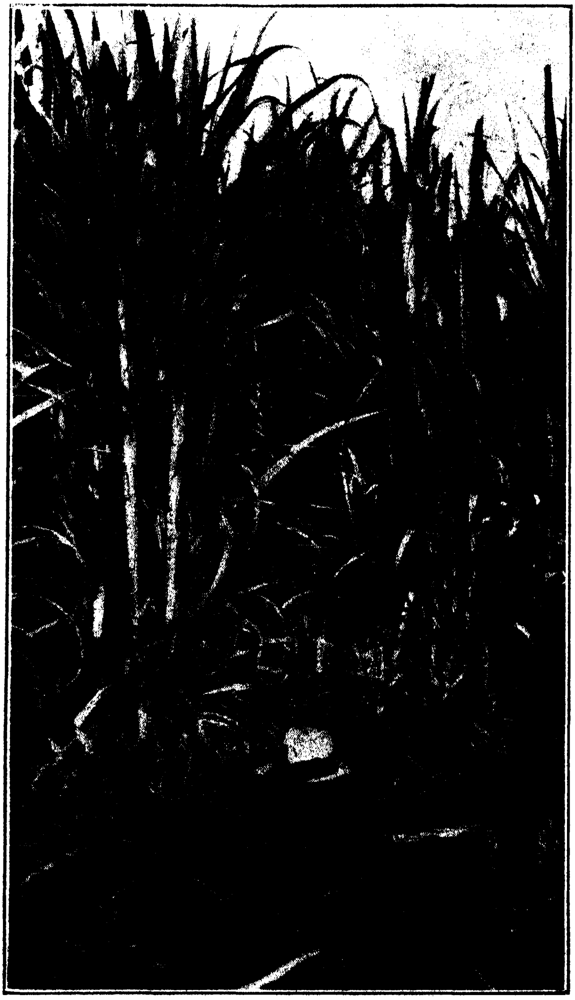


PLATE 24 (Fig. 5).—SHOWING STUNTED, PRIMARILY INFECTED STOOLS OF D. 1135.

This infection of the ratoon and plant stools is termed primary infection—i.e., coming from an infected parent. Primary infection is invariably far more serious than secondary infection. The galls are to be found on the youngest leaves as these come out of the ground, and stools so infected never become of any real commercial value. The advanced symptoms of the disease are shown by the young stalks as quickly as these stalks develop, and the stool seldom forms sticks more than 2 feet in length. Frequently a height of 9 inches is the greatest attained (see Fig. 5).

The Cause of Fiji Disease.

In spite of considerable study, very little progress has been made to date towards discovering the cause of Fiji disease.

The fact that the disease is always accompanied by the presence of galls on the leaves and in the stems of infected cane would suggest that if any causal organism is to be found it might well be looked for in the galls.

Microscopical studies of Fiji disease galls have shown that the galls are due to excessive development of the phloem tissue of the vascular bundles in those parts where galls are found (see Fig. 6). The cells of this excessively developed phloem tissue are found to contain small rounded "intracellular bodies" which, it would appear, are capable of dividing when nuclear division takes place. Studies of these "intracellular bodies" by North, Lyon (1), and Künkel (2) failed to reveal their true nature. Lyon considered them to be some stage in the life history of a parasitic organism for which he proposed the name of *Northiella sacchari.*

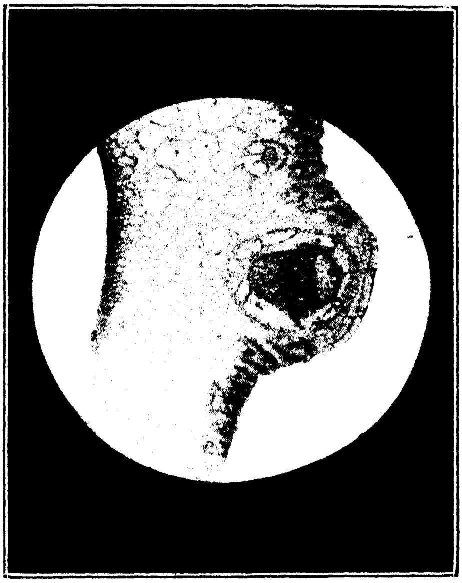


Plate 25 (Fig. 6).—Photomicrograph of Thin Section through a Young Gall.

Note unhealthy growth of phloem tissue.

Later, in 1922, F. P. McWhorter (3), of the Philippines, published the result of his investigations into the nature of these "bodies," writing:—

> "Finally, after numerous unsuccessful attempts, I have been able to culture the organism and thereby prove that it is a distinct being, and not some morbid cytoplasmic structure developed by unseen causes."

He claimed that the "intracellular bodies" are cysts, and that by watching very thin freehand sections of galls in hanging drop cultures, using cane juice as medium, he observed these "cysts" germinate into amœbæ. However, he found great difficulty in obtaining cultures, and succeeded in getting only two really good ones out of 100 trials. He named the amœboid organism which he saw *Phytamœba sacchari,* but did not actually claim that this organism was the cause of Fiji disease, and wrote:—

> "That Fiji disease is actually caused by *Phytamœba sacchari* cannot be considered demonstrated until pure cultures of the organism injected into healthy cane produce the disease under controlled conditions."

As far as is known to the writer, McWhorter's work has not been confirmed. Thus it may be said that the cause of Fiji disease remains unknown.

Transmission of Fiji Disease.

Every grower now knows that Fiji disease is transmitted by cuttings from visibly infected stalks, but it is apparently not known to all that a stalk of sugar-cane may be infected and capable of carrying disease without being sufficiently affected actually to show symptoms. In fact, it has been observed by North that the disease may remain in an apparently latent state for many months before appearing in the stool grown from a lightly infected, though apparently healthy, cutting.

This fact constitutes a serious difficulty in the selection of healthy seed, and accounts, to a large extent, for the failure of even the more careful growers to obtain an entirely healthy plant crop from apparently healthy cane selected from lightly infected fields.

The transmission of the disease by means of infected cuttings is quite possibly the chief factor in the spread of the disease through a district, but it does not explain the rapid rate of infection which takes place in a field of a susceptible variety during the course of its growth in both plant and ratoon stages.

Again, it is often found that the disease can suddenly appear in a locality situated several miles from the nearest infected field, although no record can be found of the movement of plants from an already infected area into this new locality. In a communication to the writer, Mr. Ferguson Wood cites such a case as observed by him in the Maryborough district:—

> ''From Mungar and Welcome Creek to the nearest farm in the main area infected with Fiji disease is well over 7 miles, and intervening farms are often separated or broken by patches of standing timber. The river would seem to have been the course of the infection, and the transmitter must have travelled up the river some 8 miles.
>
> ''In the case at Mungar only one infected stool was noticed, and this appeared to be secondary infection in ratoon standover cane. The grower denied having obtained plants from Maryborough at any time. Farms situated between his and the main infected area are unaffected.
>
> ''The Welcome Creek infection occurs about 1 mile down the river, and on the opposite bank to the farm mentioned above, and the same remarks apply, only one stool being found visibly affected.''

It will have been noticed that the word ''transmitter'' has been used by Mr. Wood. While Johnson's (4) recent work on Mosaic diseases shows that such a thing as the development of Fiji disease *de novo* may be considered possible until such time as it has been proved that some living organism is the causal agent, yet such evidence as given above, supported by the observation of workers in other parts where Fiji disease is known to occur, does, we think, definitely point to the existence of one or more natural transmitters of the disease. Such vectors, it is reasonable to suppose, will prove to be sap-sucking insects. As, to our knowledge, no definite experimental work has been carried out in this connection, further discussion of the matter can only lead to idle speculations, so we may pass on to other aspects of the question of transmission.

It has been shown by McWhorter that galls are present in the roots of infected stools. This suggests that the disease might possibly be carried by means of soil. However, experiments have been carried out in Fiji (by North and his assistants) and in the Philippines, in which healthy cane plants were grown in soil taken from around badly diseased stools, and in sterilised soil containing crushed-up diseased leaves, both types of experiments being, of course, checked by controls. In no case did Fiji disease show up in the resulting cane.

This shows that at least the soil cannot be held responsible for the spread of Fiji disease. However, the presence of galls in the roots of diseased stools makes it possible that the disease may be carried from a diseased stool to its healthy neighbour by some soil-inhabiting vector, but experimental evidence is entirely lacking on this point.

Another mode of transmission common to those diseases attacking plants which are propagated by means of cuttings is through the medium of the knife employed for preparing those cuttings. Conclusive experiments have been carried out by North on this phase of the question, and, as is the case with Mosaic disease, it was found that in no instance could the disease be transmitted by cutting healthy sticks with a knife which had immediately before been used for cutting diseased stems.

Thus, at present, we are only sure of one method of transmission of the disease in the field—namely, by means of infected cuttings—but the mass of field evidence shows that, in some varieties at least, some other very important mode of transmission exists. It is our intention to carry out experiments during the course of the year, aiming at finding out the part played, if any, by insects in the transmission of Fiji disease.

Varietal Resistance.

Although a certain amount of evidence on resistance and susceptibility to Fiji disease has been accumulated in Fiji, the Northern Rivers of New South Wales, and in the Philippines, we have relied rather on our own observations for information, as it is well known that resistance, like other characteristics of a variety, may often vary with changes in the conditions under which it is grown.

We have based our conclusions on resistance on what we have actually seen in the field—i.e., on the behaviour of certain standard varieties actually grown for some years in the infected localities. In this way we have been able to make recommendations, which will be detailed later, after only a comparatively short investigation, whereas, had we at once set out to carry out resistance trials with a number of varieties, our recommendations would necessarily have been delayed until evidence was accruing from such trials. This might have taken another three years or more.

Plate 26 (Fig. 7).—Showing Stem of Uba, secondarily infected by Fiji Disease.

However, arrangements have been made with a very progressive and interested grower on a badly infected though isolated farm in the Eagleby area, near Beenleigh, for fairly extensive resistance trials with promising varieties to be carried out under our supervision; so that we can hope to have experimental evidence to submit during the course of the next few years if Fiji disease still resists our efforts in controlling it.

No variety of cane has yet proved to be immune to Fiji disease—even Uba, which is considered immune to Mosaic and very resistant to most diseases, being infected in the Beenleigh district (see Fig. 7). However, some canes have certainly proved to be far more susceptible to the disease than others. Thus D. 1135 and M. 1900 Seedling are well known to be very subject to infection, while Badila (N.G. 15) and N.G. 16 are considered fairly resistant.

Our investigations, which will be given in detail later in this paper, have brought out what we consider to be definite indication of resistance to Fiji disease in Q. 813 and H.Q. 285 in the Beenleigh district.

Control.

The very effective control of Fiji disease by the Colonial Sugar Refining Company in Fiji has been largely based on the fact that cane grown on the less fertile clayey soils of hillsides invariably gives far cleaner and healthier seed, in so far as Fiji disease is concerned, than cane obtained from good free alluvial lands.

Varietal resistance was also taken into account, and Badila (N.G. 15) proved to be more or less resistant and thus suitable for cultivation in the infected regions.

Probably the most important feature of the campaign against the disease in Fiji was careful seed selection—as is stressed in a letter written by C. E. Pemberton while in Fiji in 1920 and quoted by Dr. Lyon (1):—

> "The selection of seed for planting, free from outward evidences of Fiji diseases, goes on as vigorously now as ever, though it is usually difficult to find stools affected by it. Specially experienced men pass along the rows and cut seed only from stools which show absolutely no sign of the disease. It is a matter of stool selection, rather than a selection of good sticks. Sometimes a vigorous stool will show one stick affected. The entire stool is left standing and goes to the mill to be ground, or, as on some estates, it is dug up and burned. This simple selection of seed from only healthy stools seems to have resulted in a complete control of the disease. I have been told by some of the independent planters that a brief laxity in such selection for a few seasons results in a quick ascendant return of the disease in all of the newly planted fields."

So far we have not been able to improve on these simple and common-sense methods of control. We have little or no hillside cane in the infected districts, so our control measures will consist simply of planting more resistant varieties—namely, Q. 813 and H.Q. 285—and in exercising careful selection from the poorer or heavier soils where practicable, roguing where advisable, and ploughing out of the worst fields after harvesting.

Legislative Measures.

In addition to these local control measures which strictly benefit the affected districts only, two proclamations (Nos. 11 and 12) have been recently issued by His Excellency the Lieutenant-Governor, which aim at protecting the State from wholesale infection, and eventually at eradicating Fiji disease in Queensland if possible.

These proclamations may be referred to in full on page 1816 of the "Queensland Government Gazette," published 23rd October, 1926, but for the sake of simplicity, and for the information of growers, will be interpreted here.

Proclamation No. 11 absolutely prohibits the introduction into Queensland of any portion or whole of a sugar-cane plant from New South Wales, on account of the presence of Fiji disease in that State, without the written permission of an inspector.

Proclamation No. 12 absolutely prohibits the removal of any portion or whole of a sugar-cane plant from any farm or other place situated within the counties of Ward, Stanley, Canning, or March, when such portion, or whole, of plant is to be used for purposes of planting, unless permission in writing has been obtained from an inspector.

The word "inspector" means an inspector appointed under "*The Diseases in Plants Acts*, 1916 *to* 1924." An inspector is vested with all powers necessary for the enforcement or carrying out of any reasonable measures for the control and eradication of Fiji disease. He may, for example, compel any farmer to destroy diseased plants, and may, "without notice, and with or without such assistants as he may think fit, enter at all reasonable times, upon any land, premises, or place" in order to examine any cane likely to be infected with Fiji disease.

From our experience with Queensland sugar-cane growers we feel that such a thing as *enforcement* of any measure will seldom be necessary, as every grower naturally realises that, especially in districts where cane is sent to small mills, the price obtained for cane depends largely on the efficiency of the mill, which again depends on the value of the cane sent in by the grower; he, furthermore, realises that it would mean a very severe setback to the sugar industry of Queensland if Fiji disease were allowed to be distributed promiscuously throughout our great sugar-cane tract.

Having now completed a general discussion of Fiji disease, we will go on with a more detailed account of its occurrence and control in the Beenleigh district.

ACKNOWLEDGMENT.

To Mr. D. S. North we tender our earnest thanks for his kindly advice, and for making available to us his many invaluable, though, unfortunately for science, unpublished manuscripts. We also wish to thank the farmers in the districts visited for their goodwill, keen interest, and ready assistance during our investigations.

REFERENCES.

(1) H. L. Lyon.—"Three Major Cane Diseases—Mosaic, Sereh, and Fiji Disease." Bul. Exp. St. H.S.P.A., Bot. Ser., vol. iii., part i., Honolulu, Hawaii, August 1921.

(2) L. O. Kunkel.—"Histological and Cytological Studies on the Fiji Disease of Sugar Cane." Bul. Exp. St. H.S.P.A., Bot. Ser., vol. ii., part ii., Honolulu, Hawaii, April 1924.

(3) Frank P. McWhorter.—"The Nature of the Organism found in the Fiji Galls of Sugar Cane." "The Phillipine Agriculturist," vol. xi., No. 4, November 1922.

(4) James Johnson.—"A Virus from Potato Transmissible to Tobacco." Phytopath. 15, 46-47, 1925.

PART II.

Investigations in Beenleigh District.

The arable lands of this district consist chiefly of heavy to sandy alluvial loams, which, generally speaking, show improvement on the application of lime. Drainage is on the whole fairly good. Most of the farms are situated on the banks or near the mouth of the Logan River and along the banks of the Albert River, in country which is very flat and only a few feet above sea-level. Though bananas, pineapples, grapes, and many other crops are grown on neighbouring hills, such as Mount Yellowood, sugar-cane cultivation is practically entirely restricted to the low-level country, with the exception of a few hundred tons grown in parts of Eagleby, Carbrook, and on a small red-soil hillock at Agaston.

In some parts of the district sugar-cane has found a keen rival in arrowroot, which also does well on the dark soils.

Extent of Infected Area.

This can be stated in few words. It was found that the disease had spread to every portion of the cane-growing areas drained by the Logan and Albert Rivers or their tributaries.

It need scarcely be said that this is a serious state of affairs, and will make the task of controlling Fiji disease in the Beenleigh district a difficult one.

The infection has taken place quite regardless of soil or locality, though these factors have certainly affected its intensity, it being found that infected cane suffered most heavily on the rich soils lying near the river banks.

During the course of inspection, 127 farms were visited, and out of these 80—i.e., about 62 per cent.—were found to be infected with Fiji disease.

Varieties Grown, and Their Degree of Infection.

Many varieties are grown in the Beenleigh district, but only the more important ones and those of special interest need be mentioned.

Green Goru (N.G. 24) is grown in small patches on a few farms. In some cases it has done fairly well. However, it is very subject to gumming disease

(*Bacterium vascularum*), which is present practically all over the district. Much of this variety here is infected with Mosaic disease. A few stools were found showing Fiji disease.

Baruma (N.G. 48), or Green New Guinea as it is called in this district, was found infected in only one field, although small areas of it are found on many farms. However, it is not a desirable cane, as it stands at present in these parts, being from 50 per cent. to 100 per cent. infected with Mosaic disease; and being of rank growth with strong tendency to lodge. It shows marked stunting when infected with Mosaic.

Plate 27 (Fig. 8).—Good standover Q. 813 on Mr. J. M. Stollznow's Farm at Pimpama Island.

Purple Top (N.G. 64) is grown on a few farms. It is more susceptible to Fiji disease than Baruma, but is not yet seriously affected. However, it is very subject to gumming, one field visited showing 100 per cent. infection in young plant and ratoon cane.

E.K. 28 and *E.K. 1* were found growing on only one farm. Both plant and ratoon of each variety were infected to the extent of 14 per cent. to 15 per cent.

Uba was seen on only one small field in which three stools were infected with Fiji disease (see Fig. 7). It is grown for fodder only in this district.

Kikarea (or Striped New Guinea) is grown on a few farms. In two fields one or two infected stools were found. This cane sometimes does well, but is an uncertain ratooner and hence is not popular.

Meerah was seen growing on two farms, where it showed about a 5 per cent. infection with Fiji disease.

M. 1900 Seedling.—This cane was found on eight farms. On six of these farms it was infected with Fiji disease. It is very susceptible indeed. It is also very subject to root diseases of various forms and to gumming disease.

H. 227.—A few rows of this variety are grown on one farm amongst other infected canes. The original plant cane, now first ratoon, is free from infection, but this year's plant cane, grown from the above, is 6 per cent. infected.

Q. 855.—A few rows of this cane are grown on the same farm as H. 227. The variety is now 7 per cent. to 8 per cent. infected.

D. 1135.—This cane forms the staple variety on 102 of the 127 farms visited, 76 per cent. being more or less heavily infected with Fiji disease. This variety is probably the most susceptible to the disease, and the fact that it has been in the district for some twenty years, and is so widely grown, probably accounts for the widespread distribution of the disease. This variety is considered one of the most susceptible on the Northern Rivers of New South Wales also.

When it is realised that very few infected stools are of any commercial value, excepting when infected shortly before the crushing season, it is fairly easy to estimate the dead loss due to Fiji disease in an infected field. In this area such losses generally range as follows:—Plant cane about 5 per cent., in first ratoons about 13 per cent., and in second and third ratoons about 20 per cent.

These figures are based on counts made with tallymeters along several average rows in different fields, and take into consideration only the loss directly due to the disease; they do not make any allowance for losses due to weed infestation, with its consequent need of extra labour.

Losses can sometimes be much greater, especially on rich sandy alluvial soils near the river banks. In one such farm two counts were made, one in January and another in May, in a field of young first ratoon D. 1135. In January it was found that 42 per cent. of the young stools were diseased and stunted, while in May the figure had risen to 53 per cent., many of the stools having died out altogether. The field was so badly affected as to hardly pay for cultivation and harvesting. When first inspected the disease may have been latent in some stools. This would account for the large rise in the figures.

It is the general opinion of the growers in this district that Fiji disease is causing greater damage and loss each year; in fact, it is only recently that the damage has been brought well home to them. They are well aware that most of this loss occurs in D. 1135 and are on the lookout for some cane to replace it.

Q. 813.—This variety is at present grown on 56—i.e., 44 per cent.—of the farms visited. It has proved very successful indeed from the cultural point of view, giving excellent plant crops, if not cut too early, and usually very good ratoons, except on the more sandy soils. It also has the advantage of being quite a good standover cane (see Fig. 8). Furthermore, it usually tops the score in c.c.s. tests in this district. It is a cane which strikes well and quickly, matures in about eleven months, and should be harvested from August onwards. It has proved very resistant to gumming and Mosaic in all Queensland districts to date.

Q. 813 was introduced into the Beenleigh district in 1919, and is rapidly gaining the confidence of the growers. It was found infected with Fiji disease on six farms, although in most cases it is growing next to fairly badly infected D. 1135. The highest percentage of infection found was 7 per cent. In this case a single short row of nearly 100 stools had been growing for three years in a field of D. 1135, which is now showing about a 20 per cent. infection. The field had been cut once last year. Two other small fields of Q. 813 showed a 3 per cent. infection, and it was found that they had been planted from material taken from another lightly infected field, which indicates that the infection in these two fields was primary. This leaves us with three more infected fields to account for. These were small fields of from 2,000 to 4,000 plant stools growing next to infected D. 1135, and the infection in the Q. 813, probably of secondary nature, was restricted to from one to four stools.

From these facts we are naturally led to the conclusion that with a little care on the part of the growers concerned most of this Q. 813 could have been kept clean—i.e., all of it with the exception of the single row of first ratoon which showed 7 per cent. infection, and which should be ploughed out after harvesting. It would seem, also, that the rate of spread of Fiji disease infection in Q. 813 is very slow as a rule, especially when it is considered that we were unable to find infected stools on fifty of the farms growing the variety.

Summarising, it may be said that, generally speaking, Q. 813 is a better cane for the district than D. 1135, and is considerably more resistant to Fiji disease than the latter.

H.Q. 285.—This cane is known to some growers as Milton, Nerang, or Hambledon Seedling. It was introduced into the Beenleigh district about 1914, but is only lately coming into favour. It is a good early maturing cane, gives good ratoons on most soils, and can be harvested with safety at the beginning of the crushing season. It cannot always be relied upon for a standover crop, being somewhat susceptible to fungous diseases of the stem when mature, and should thus be cut in preference to Q. 813 where there is a likelihood of its being necessary to let some of the crop stand over.

It is also a fairly high density cane and thus has many points in its favour from the commercial and cultural aspects alone. The illustration (Fig. 9) shows what can be expected of this cane in the Beenleigh district.

Although at present growing on fifteen farms in the midst of infected D. 1135 fields, we have, so far, only been able to find one single stool showing Fiji disease. This single stool was situated in a field of about 5 per cent. infected standover D. 1135, where it had probably been planted accidentally with D. 1135 sets. Thus, as in the case of Q. 813, it may be assumed that H.Q. 285 is considerably more resistant to Fiji disease than D. 1135.

Control Measures.

The position in the Beenleigh areas, in so far as Fiji disease is concerned, is a very dark one, but is far from being hopelessly so.

It is true that the staple cane of the district is severely infected, but it should be remembered that this cane—viz., D. 1135—has been grown from cuttings in this small district for twenty years or more with few or no changes of soil, which are said to be beneficial in keeping up the vigour of a variety, and little or no attention to the disease question.

Until quite lately the growers did not realise that Fiji disease was actually a serious infectious disease, but merely took it to be a mysterious stunting, perhaps due to insect attack or to some inauspicious soil condition; and so they planted on merrily, avoiding only sticks so diseased as to be quite worthless as seed.

And, now, something of the order of 8 per cent. of the cane grown is a dead loss. This position has arisen during the course of about ten years, and there is no evidence to indicate that the annual toll of stunted and useless plants has reached a standstill as some farmers seem to believe. If damage can increase from 0 per cent. to 8 per cent. in ten years, it is obviously unwise to allow matters to go on in the old slipshod fashion and chance what may happen during the next ten years.

Furthermore, at present, but a very small area, comparatively speaking, is infected in Queensland, and every effort must therefore be made to prevent further contagion and eventually State-wide ravages.

The control measures which we propose are as follows:—

(*a*) *The Use of More Resistant Varieties.*—From our observations in the field, we have come to the conclusion that Q. 813 and H.Q. 285, besides being suitable canes for the district, show a certain amount of resistance to Fiji disease. How great this resistance will yet prove we cannot tell, but certain it is that these canes give the growers ample supply of clean material from which to commence planting operations next August and September.

After much careful consideration of every aspect of the question, we feel justified in recommending that, as far as possible, Q. 813 and H.Q. 285 be planted in future to replace D. 1135, M. 1900 Seedling, Purple Top (N.G. 64), and those other varieties which, for reasons already given, we do not consider it advisable to plant further for some time to come at least. If, after a few seasons more have passed, we find that Fiji disease is quite under control, or possibly eradicated, consideration might be given to a reintroduction of some of these canes if such reintroduction did not threaten to re-establish the disease.

Planting of H.Q. 285 should be restricted to a quarter or a fifth of the area planted by each farmer and used mainly as an early maturing cane to be cut early in the crushing season.

(*b*) *Seed Selection.*—Since a little of the Q. 813 in the district is already slightly infected, and since some fields of Q. 813 and H.Q. 285, owing to situation in very close proximity to other badly infected varieties, cannot be regarded as being safe for use as seed, it is obvious that indiscriminate planting of even these two varieties should be avoided. Growers should be careful in the selection of the material they propose using for plants. Seed selection, to be properly carried out, is a task which requires a certain amount of experience which many growers do not possess, and so every assistance is being rendered by the Bureau in this matter.

During the month of January certain fields were noted as being suitable sources of plants owing to their possessing such desirable features as freedom from disease, thrifty growth, suitable age of cane, &c. A second careful inspection of these fields was made in May. The owners were then consulted, and they agreed to sell cane from these fields for plants next September at the price per ton being then paid at the mills supplied by them, provided the buyer cuts and transports his plants himself. The following is the list of growers who have agreed to sell cane which we have inspected and declared suitable for planting purposes, together with their postal addresses:—

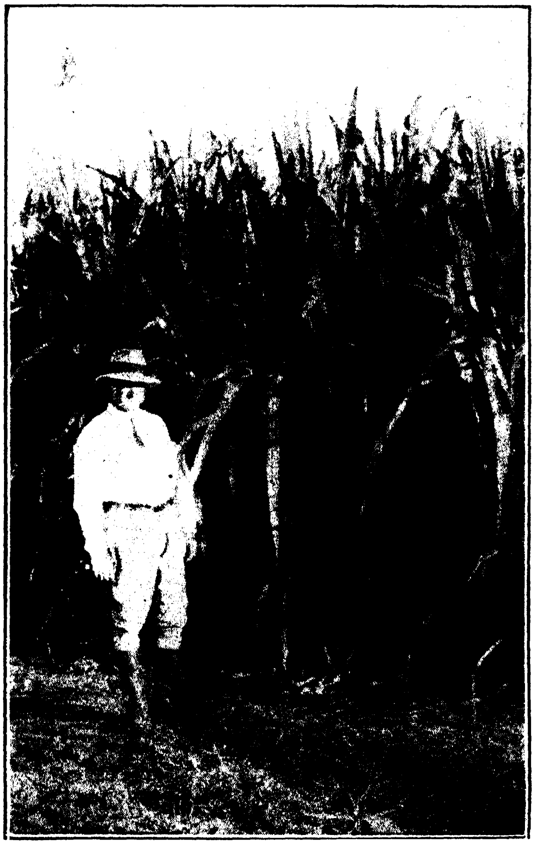


Plate 28 (Fig. 9).—Eight-months-old Plant, H.Q. 285, on Mr. J. M. Stollznow's Farm, at Pimpama Island.

Q. 813—

- Latimer, J. W., Norwell road, *viâ* Yatala.
- Stollznow, J. M., Pimpama Island road, *viâ* Yatala.
- Haack, F. W., Pimpama Island road, *viâ* Yatala.
- Enckelmann, M., Agaston, Alberton.
- Enckelmann, J. T., Pimpama Island.
- Stollznow, W., Eagleby.
- Stern, A., Carbrook.

H.Q. 285—

- Latimer, J. W., Norwell road, *viâ* Yatala.
- Stollznow, J. M., Pimpama Island road, *viâ* Yatala.

Since, under the Diseases in Plants Acts (Proclamation No. 12), it is not permissible for anyone to remove or have removed from a farm any cane destined for use as plants, without the written permission of an inspector, the above listed growers have been issued with the necessary permit, thus enabling them to sell cane from specified fields for plants, and enabling the buyers to take these plants to his own farm. However, it must be borne in mind by growers obtaining plants from farms other than their own and those listed above, without the written permission of an inspector, that by doing so they render themselves liable to a heavy fine.

In order to simplify matters as far as possible for the growers, a brief circular will be posted to each one, explaining what action he must take if he desires to obtain plants from some farm not listed above, and enclosing a simple form which he should fill in, stating what variety of cane he desires, and from which farm he proposes obtaining it. These forms should be posted to the Director, Bureau of Sugar Experiment Stations, Brisbane, before the end of August. In most cases we will be able to decide whether the issuing of a permit is or is not advisable by consulting our field books. However, to facilitate matters further, arrangements will be made for an officer of the Bureau to spend a fortnight or more in the district in September, during which time he will select seed for the growers, and, where necessary, issue permits to plant. An announcement will appear in the public Press notifying the district of the date of his arrival and his address in the district.

Beyond the steps outlined above there is little else which the Bureau can do at present, and the successful control of Fiji disease rests largely with the goodwill of the growers themselves. We are willing to help the growers as far as lies in our power, but the man who will not help himself is not deserving of any help from us. If he will not do his bit towards checking the disease in his fields he is a menace to his neighbours, and cannot in any way claim to be a good farmer.

(*c*) *Destruction of Diseased Stools.*—Since neither Q. 813 nor H.Q. 285 is immune to Fiji disease, it will be found that, however careful the grower may be, a little of the disease will creep into the Q. 813, and possibly the H.Q. 285, in certain cases. However, if all diseased stools be dug out immediately they are noticed it will be possible to keep the disease in check, and with care to eradicate it from such lightly infected fields. Badly infected ratoon fields of D. 1135 and other susceptible varieties should be ploughed out after harvesting, as they are a constant source of infection to healthy fields.

This concludes the writer's report on the Beenleigh investigations, but to make this paper more complete Mr. E. J. Ferguson Wood has kindly agreed to submit a few notes on the Maryborough district, where Fiji disease was studied by him. An earlier report by him on this district has already been published in the "Queensland Agricultural Journal" for May, 1927.

PART III.

Investigations in the Maryborough District—Extent of Infection.

In the Maryborough district the Fiji disease infection, principally in D. 1135, extends along both banks of Tinana Creek, from Bullwell School to the Mary River and down the Mary River to below Point Lookout and up to a point 3 miles above the Lamington Bridge.

Isolated cases have occurred at Walker's Point, Welcome Creek, and Mungar; along the Mary River and on the Gympie road. In both these districts the only case of occurrence away from river flats is the one at Melrose. This is on red ironstone forest soil and about 2 miles from the river on a low hillside.

Control.

The control measures recommended at Maryborough are simpler than those for Beenleigh, as stocks of clean seed can be obtained from Pialba and within the Maryborough area. Arrangements will be made for an officer of the Bureau to visit the infected areas during August or September to assist farmers with the selection of cane for plants.

Roguing of fields less than 5 per cent. infected, ploughing out after harvesting of badly infected crops over 10 per cent., and the trial of Q. 813, H.Q. 285, and Petite Senneville as comparatively resistant varieties, have been advised.

In Maryborough Q. 813 does not seem to be so resistant, but this may be only apparent. Fairly heavy infection has been observed at Granville, where diseased sets have been planted. It may well be that a few original stools became infected and that these served to propagate the disease widely over a larger area, or another factor may come into play.

It has been observed in connection with Fiji diease and Mosaic that varietal resistance seems to vary in different localities. Field evidence makes it necessary to lay stress on this apparent variation, which may be due to the following causes:—

(1) Variation in susceptibility of the cane, owing to different soil and climatic conditions.

(2) Presence or absence of a given insect vector, or the modification of its habits due to (*a*) its relations with the surrounding flora, (*b*) the attraction or repulsion of the insect from different varieties of cane, modified by variations in cell sap content due to edaphic and climatic factors as stated in (1).

LIVE STOCK AND MEAT INDUSTRY EXHIBIT—ROYAL NATIONAL SHOW.

The Council of the Royal National Association has undertaken a big task which shows every evidence of being thoroughly done, in the staging of a live stock and meat industry exhibit as a special feature of this year's show.

Mr. W. J. Affleck, chairman of the council, has undertaken the work of council steward. Mr. E. J. Sunners will act as hon. council steward, and a committee, each of whom will have some direct sectional interest, is being formed.

It is quite possible that the elaborate staging of this exhibit and the emphasising of its strong educational features by the adoption of special display methods will cost the association well over £2,000.

It is recognised, however, that at this particular time the meat industry is in need of greater lessons pointing the way to greater economic utilisation of the by-products of the industry, as well as to those lessons which point to the great savings effected in a public abbatoir system.

A special building is being designed, and every correlated secondary industry will be featured in interesting educative fashion.

The Minister for Agriculture has expressed his keen interest in the whole programme, and has already granted a subsidy towards this work, and promised to make available the services of departmental specialists in certain sections.

The complete details are not yet available, but it is sufficient to say that this exhibit will excel, in many respects, any previously staged by the association, and will be of wonderful interest to cattle-grower, pastoralist, meat trader, and householder alike.

"ONE OF THE BEST."

A Marburg farmer writes (11th June, 1927):—"Only just recently have I discovered an old 'Queensland Agricultural Journal,' and as I read it I formed an opinion that it is one of the best journals circulating among the farmers, because it is full of advice and guidance for the man on the land. I am forwarding my subscription herewith."

CANE-GROWING AND ITS PROBLEMS.

FIELD DAY AT MACKAY.

PRIMARY PRODUCTION AND SCIENTIFIC RESEARCH.

The Annual Field Day under the auspices of the Bureau of Sugar Experiment Stations was held at the Mackay Station on 17th June.

The attendance numbered over 600 and included not only farmers, but representatives of the Scientific, Manufacturing, and Commercial sides of the industry. Subjoined is an abridged report of the proceedings.

THE Annual Field Day for the Mackay district was conducted on 17th June. The attendance numbered some 600, including not only farmers, but also mill managers, chemists, and business men. As is customary on these occasions, the visitors, in two parties, were conducted over the experiment plots, and the nature of the work in connection with each plot was explained either by Mr. H. T. Easterby, Director, or by the chemist in charge, Mr. F. Keogh. A preliminary address was given by Mr. Easterby, who apologised for the absence of the Minister for Agriculture (Mr. W. Forgan Smith), who had hoped to be with them, but in his capacity of Acting Premier had been called away to Melbourne. He welcomed the presence of Professor Goddard, Dean of the Faculty of Agriculture in the Queensland University, referring to the valuable work that gentleman has performed in connection with disease investigation for the benefit of banana growers, and particularly to the assistance afforded to the work of the Bureau of Sugar Experiment Stations in the training of pathologists and entomologists. As a result of this training they now had a number of men in the field rendering scientific assistance to the canegrower. He mentioned also that the students who had been abroad benefiting from the travelling scholarships, would shortly return to Queensland; and he was hopeful that by next year the bureau would have a scientific staff as efficient as could be found in any part of the world.

The excellent condition of the cane in all the experiment plots was the subject of favourable comment, though the area under crop was smaller than in 1926, a certain proportion of the land being in fallow.

THE ADDRESSES.

SCIENTIFIC RESEARCH AND THE SUGAR INDUSTRY.

Under the chairmanship of Mr. Easterby, short addresses were delivered in the lunch hour.

Professor E. J. Goddard, B.A., D.Sc., Dean of the Faculty of Agriculture, gave a most informative discourse on the measures at present being adopted by the Commonwealth and State Governments, and by the Queensland University, to promote the interests of agriculture generally, and particularly those of the sugar industry.

In the course of his address, as reported in the "Mackay Mercury" of 18th June, Professor Goddard said that he had remarked during the few years of his association with the biological problems in relation to agriculture in Queensland, the desire of the Director of the Bureau of Sugar Experiment Stations to co-operate with every scientific effort to solve the problems connected with the industry. Mr. Easterby's efforts to secure the efficient training of cadets in plant pathology and entomology had counted for much in the fight to secure a Faculty of Agriculture. Now that this had been brought about there was a great desire on the part of the University to afford thorough training to young men and cadets for every type of specialisation required in dealing with the problems of tropical agriculture. Many of those problems were of an economic nature; but it might readily be that scientific research shall lead to a solution of many of the difficulties included in this complex. At all events, that was the interpretation which he was personally inclined to place on modern scientific effort, and that was the outlook which the Faculty of Agriculture was desirous of implanting in the agricultural students during their training. Professor Goddard emphasised the importance of science to agriculture, and appealed to the farmers for their sympathetic co-operation with the efforts of the Bureau, and with the scientific officers associated therewith.

National Problems.

The problems of the sugar and other tropical industries are matters of concern to the Commonwealth and Queensland, he said. The Commonwealth Government has recently replaced the Bureau of Science and Industry by the Council for Scientific and Industrial Research, a body which has already during its brief period of existence set to work to tackle our problems in dead earnest. Men are being sent to various parts of the world to receive specialised training in many and varied aspects of agricultural industry, and there can be little doubt that within a few years all branches of agriculture which afford problems of a national nature will be equipped with fully-trained men. The Empire Marketing Board has recently offered to assist in the foundation of a Tropical Agricultural Research Station in Queensland. This offer means that, provided the Commonwealth Government contributes on a £1 for £1 basis, the Marketing Board will make available a capital grant of £25,000 and contribute an amount of £5,000 per annum for five years for the upkeep of such an institution. The idea is to add another station to the circle of stations now constituted by that at Trinidad and that at Kenya for the investigation of tropical products within the Empire. We have every hope that this arrangement will be finalised by the Commonwealth Government. We are now concerned in locating a suitable area for such a station, and then will be in a position to draw up concrete plans which will enable us to outline a scheme of attack on tropical agricultural problems of concern to Queensland and the mandated territories.

How the Queensland Government Assists.

The State Government of Queensland is doing everything possible in so far as your industry is concerned to furnish you with a full complement of scientific officers. Three such excellent officers are receiving abroad special training in sugar problems and are completing such by actually visiting all the sugar-producing countries of the world. A number of young men have been trained or are at present being trained at the University. The University is carrying out investigation into your problems, and has recently erected special laboratories, part of the responsibilities of which embrace your problems.

Necessity for Scientific Guidance.

Why all this effort? Because those who share the responsibilities of the sugar industry appreciate the fact that here, as in all agriculture, there is necessity for scientific guidance, and that without such there can be nothing but chaos, both in the productive and economic spheres. Here, as in all other agricultural industries, however, the efforts of scientific and technical advisers will be futile unless there is the utmost co-operation on the part of the grower. It is the duty of every individual grower to recognise his responsibilities to the industry and his duty to urge all other growers to carry through efficiently all recommendations made. Every day we are learning that various diseases of plants are playing a bigger part in plant destruction and ruination of industries.

100 Per Cent. Co-operation and Efficiency Required.

These insidious diseases are due to ultra-microscopic germs which are distributed in two ways—namely, by diseased stock and by sucking insects, such as aphides and hoppers. The only way of fighting such diseases is by placing an embargo on distribution of stocks by growers, immediate notification of the disease, immediate destruction of affected material, careful inspection of fields by the owner, &c. I have had much experience in this connection with bunchy top disease in bananas. It has been preached continuously for the past two years that once the disease has made its appearance in a plant nothing on earth can cure that disease—immediate destruction is necessary. Arbitrary shifting of suckers will spread the disease from locality to locality, and in any new locality the banana aphide will carry the disease from diseased to healthy plants. If every banana grower would do his bit, we could stamp out that disease completely and restore that important industry in all affected areas to a level far higher than previously existed. You have similar problems, such as Fiji disease, and the same advice applies. Every country deserves the pests it has—the control is in the hands of the community. But we must have 100 per cent. co-operation and efficiency on the part of the producer. I would make bold to say that, generally speaking, pests as such do not baulk the scientific adviser, but humanity constitutes the problem.

Biological Control of Insect Pests.

It is the aim of the scientist dealing with pests to elaborate means of dealing with such in a way that will be easiest and most practicable for the producer. The ideal would be to find a natural or introduced enemy of a pest and combat it in that way. This is the method of biological control, and much remains to be done in that connection. Much can be done along the lines of biological control and we are now endeavouring to concentrate researches along those lines.

Yet all problems do not lend themselves to such treatment. There will always remain problems in which success depends on the efforts of the producer. Many problems lend themselves to mechanical control only, and the recommendations made, say, in respect of certain insect pests of cane, by your technical advisers depend for their success on you. Fruit fly is an excellent example. You must not expect that the scientist should wave a magic wand to eradicate your troubles. Effort on your part is the factor for success. Serious care and responsibility are the duty of the scientist, and, equally of the grower. It has been the habit too much in the past to focus attention on pests when they have assumed the status of epidemics. Yet there are many pests constantly doing damage to the extent of 10 or more per cent. which should have been tackled as soon as they appeared. I suppose if we could measure the damage done we would find that no crop produced in Australia suffers less than 15 per cent. loss due to pests and ineffective production. We must imitate the Americans in thoroughness. There are problems of transport also, and these are receiving attention from a committee of experts now visiting the North.

Hold on to What We Have!

While these are matters of deep concern, it is essential that we hold on to what we already have, and assist those whose responsibilities are to guard existing assets. Your industry is probably the best organised in Australia. I appreciate the co-operative spirit among you, but I would advise greater co-operation in so far as individuals are concerned. A great responsibility rests on you. The North is destined to attract more and more serious attention—it now has the interest and consideration of all who think on natural lines. I am pleased to have the opportunity of meeting you and voicing the interest of the University in your problems and those of the tropical North.

CANE PESTS AND DISEASES.

Mr. E. J. Ferguson Woods spoke on the symptoms of the three major diseases of the sugar cane—namely, Mosaic, Leaf Stripe, and gumming, illustrating his remarks by showing specimens of sugar-cane affected. He spoke also of a number of the minor diseases, such as red rot, and certain root diseases. He mentioned as an evidence of the usefulness of the experiment station that it was at the request of the farmers themselves that specimens illustrative of the various diseases had been brought for their inspection on this occasion.

Mr. R. W. Mungomery, assistant entomologist, gave an address on the various species of grub working mischief in the canefield. Different varieties needed different control measures, as, for example, those grubs whose beetles, like the greyback, feed on the foliage of figs and eucalypts; the beetles may be got rid of by cutting down their feeding trees, and in consequence grubs will disappear in the following seasons. In the case of other beetles which do not feed, or which feed only to a limited extent, such a procedure is useless. Where the destruction of feeding trees is not possible or when dealing with grubs of the latter class of beetles, recourse must then be made to the use of fumigants placed in the soil in proximity to where the grubs are feeding. Fumigants, such as carbon bisulphide, or paradichlorbenzene, injected into the soil in doses of ¼ oz. 15 inches apart near the cane stools, and at a depth of about 3 inches, have been the most successful that have yet been evolved in combating these pests.

"THE BIGGEST SHILLING'S WORTH."

A North Coast farmer writes (13*th June*, 1927):—*"Am sorry I am so late with my renewal as I do not like being without the Journal. I think it the biggest shilling's worth in the way of a farm journal. Would it be possible to start my renewal with the June number?"*

SOME HAWAIIAN EXPERIMENTS IN THE BIOLOGICAL CONTROL OF INSECT PESTS.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

Biological control is the term generally employed to denote the part played by natural enemies introduced for the specific purpose of checking the increase of an insect pest of an economic plant. It is a term that is also applicable to such undertakings as the present campaign for the control of various species of prickly-pear by the introduction from America of certain of their insect enemies.

A survey of agricultural conditions reveals the fact that among the worst pests with which the producer has to contend are many accidentally introduced insects. In the early days of the modern world-wide migration of the white race, economic plants were transported from one country to another on quite an extensive scale, and not unnaturally some of the destructive insects associated with these economic plants were unintentionally transported with them. In many of these cases the accidentally introduced insect pests were unaccompanied by the insect and other enemies that kept them more or less under control in their original homes. Under such circumstances many introduced insects, that were only relatively unimportant pests in their native lands, became responsible for extremely serious losses in the countries to which they unfortunately gained access.

Objective in Biological Control.

The objective in the biological control method of fighting introduced insect pests is to readjust the balance by bringing in and establishing the natural enemies that were left behind when the destructive insects migrated. If success is achieved in the introduction of these enemies then the normal balance of nature will be more or less restored, and the numbers of the destructive insects will be so greatly reduced that the pests dealt with in this manner will cease to be of outstanding importance.

Natural Enemies of Destructive Insects.

The chief enemies of destructive insects are other insects which, instead of attacking plant life, habitually feed on insect life, either as internal or external parasites, or as predators that simply seize and destroy their prey. Mention may also be made of the valuable control factors represented by introduced insectivorous birds. Other small animals, such as the mongoose, have also been used as introduced natural control factors, but the case in their favour has not been clearly demonstrated. The utilisation of fungus and bacterial diseases of insects has also been discussed, but, speaking generally, comparatively little progress has so far been made along this line of attack.

Hawaiian Experiments in Biological Control.

The biological control method of fighting destructive insects has been given particular prominence in connection with sugar-cane pests, and it seems well worth while to direct attention to some of the results achieved in the application of biological control to that branch of economic entomology. Sugar-cane entomology affords excellent examples of the success of the method, where conditions are favourable, and hence the three instances of biological control quoted in the following paragraphs are all associated with sugar-cane, and, further, all were carried out in the same country—namely, the Hawaiian Islands.

The Sugar-cane Leafhopper.

The first illustration of biological control is one that should be of particular interest to Queenslanders, because the insect fought in this case is one that has intimate associations with Australia—in fact, Queensland is its native home. Here reference is made to the sugar-cane leafhopper which was accidentally introduced from Australia to Hawaii shortly before 1900. The insect in question is regarded as a minor pest in Australia, but on its introduction to Hawaii it spread and multiplied with astonishing rapidity, and by 1902 the position had become so serious that the insect was estimated to be responsible for a loss of £500,000 annually. The Hawaiian Sugar Planters Association accordingly organised an Entomological Branch, and the investigation of the problem was commenced.

It was evident that the insect was a recent importation, and it was equally clear that it was not subject to the attacks of many enemies, although a few relatively unimportant native Hawaiian insects have turned their attention to this newcomer from Queensland. Eventually it was demonstrated that its native home was Australia, and an investigation of the sugar-cane districts of this State revealed the presence of a number of enemies that were keeping it in check.

It was found that three extremely small wasps were breeding in the eggs of the leafhopper, and as a consequence the attacked eggs were destroyed. These wasps were introduced into Hawaii, and certain other enemies were obtained elsewhere. These importations produced a marked improvement in the situation, and a visit to Hawaii in 1914 afforded convincing proof of the fact that on the majority of the sugar-cane plantations appreciable losses had been practically eliminated.

The entomologists, however, were not fully satisfied with the position, because, on a few plantations where climatic or other conditions were abnormal, serious losses were still being experienced, and on one plantation on the Island of Hawaii the position was far from satisfactory.

This led to a renewed search for further enemies, and Queensland again supplied requirements in the shape of a very small bug that lives by extracting the leafhopper egg contents through punctures made by its sharp beak. The relationship of this bug to the sugar-cane plant was not clearly understood in the earlier investigations, but, in 1919, it was fully demonstrated that it was not a sugar-cane pest, but was actually a very valuable enemy of the leafhopper.

It was accordingly introduced to Hawaii, and the remaining leafhopper infestations were brought under control. The financial result of the application of the biological control method in this particular case is that an annual loss of £500,000 has been virtually eliminated.

The Sugar-cane Beetle Borer.

A second serious pest in the Hawaiian Islands was the sugar-cane beetle borer, the original home of which is believed to have been New Guinea. The annual loss in this case was regarded as being in the vicinity of £250,000.

Being an introduced pest the biological control method was again employed, and a fly parasite was eventually discovered in the Dutch East Indies. After encountering many difficulties this parasite was successfully transported to Hawaii in 1910, and during a visit paid to that group in 1914 it was observed breeding freely on the great majority of the plantations, and it has obviously succeeded in very materially improving the situation.

The Anomala Grub.

The third Hawaiian success to which attention might be directed is the control of the Anomala grub. The white grubs of this beetle, which were probably introduced from the Far East, first caused noticeable injury in the year 1912. On a visit being paid to Hawaii in 1914, it was observed in enormous numbers in the magnificent rich, red soil on two of the largest plantations on the Island of Oahu, the infestation extending over several miles. Fortunately, its rate of spread was slow, and the entomological staff decided to endeavour to nip in the bud an infestation which, although restricted to a relatively small area, was nevertheless responsible for an annual loss of £20,000. Further, it was bound to spread throughout the whole of the group if left uncontrolled, and hence it constituted a very serious menace to the whole of the plantations of Hawaii.

Again a search for parasites was commenced, and in 1916 a wasp parasite was introduced from the Philippine Islands and was eventually permanently established. On a return visit to Hawaii, in 1917, the parasite was seen breeding in very large numbers, and here again a marked measure of success was obtained, and it is now possible to say that the Anomala grub menace to the uninfested plantations no longer exists.

The particularly interesting point about this case is the fact that biological control was established before the pest had become distributed throughout the length and breadth of the Hawaiian Islands. In the case of the leafhopper and beetle borer, the whole of the plantations were more or less infested, and enormous losses had been sustained before biological control was attempted.

Success Achieved in Hawaii.

Such is the record of three very fine instances of entomological work in the Hawaiian Islands. Although many of the parasites experimented with were failures, success was eventually achieved in each of the three major problems attacked by the staff. The balance-sheet on the whole is a very favourable one, and the expenditure involved in the investigations has been returned a hundredfold.

One cannot but admire the splendid faith displayed by both the Hawaiian Sugar Planters' Association and its entomologists in carrying out the work, for it must be remembered that frequently years of arduous, discouraging, and even dangerous work had to be undertaken before success was finally achieved.

It is but right to draw attention to the fact that the conditions in Hawaii are particularly favourable for this type of entomological control work. Success has, however, been achieved elsewhere in eliminating certain difficult problems, and there are doubtless many others that can be satisfactorily handled in this manner. Biological control is, however, generally applicable only to introduced insects, and it is usually, but not invariably, of little assistance in the campaign against native pests.

Queensland Experiments in Biological Control.

Mention may be made of the fact that the biological control method has also been extensively employed in the United States, Fiji, Mauritius, South Africa, New Zealand, and Australia, as well as in several other countries. In Queensland very considerable success has been achieved in controlling woolly aphis of apples by means of a small wasp parasite, while colonies of a predaceous beetle have been introduced from Java in an attempt to minimise the losses caused by the banana weevil borer. While it should be clearly understood that, as a rule, success is possible only in the case of its application to introduced insect pests, there is, nevertheless, a large and promising field for this type of work wherever immigrant entomological problems are a serious factor in determining the degree of success likely to be achieved in agricultural or pastoral pursuits.

THE QUEENSLAND AGRICULTURAL BANK.

MR. A. P. DESHON APPOINTED MANAGER.

The original Agricultural Bank Act was passed in 1901, and the recently appointed manager of the Bank, Mr. A. P. Deshon, joined the institution at the time of its actual inception the following year. At that time the staff consisted of the then manager and Mr. Deshon. In the meantime he has been closely associated with every section of the bank's many activities.

The institution has grown rapidly having a present staff of 100. It has branches in the principal country centres, and makes advances averaging well over £1,000 per day, and is undoubtedly one of the most important factors at the present time for the advancement of Queensland agriculture.

Mr. Deshon, who is a Queensland native, was educated at the Brisbane Grammar School, and prior to joining the Agricultural Bank was engaged in mercantile pursuits. In addition to his long experience of finance and business, Mr. Deshon has personally a first class knowledge of rural pursuits and land economy.

His father was the late Mr. Edward Deshon, C.M.G., a former Auditor-General of Queensland. The latter gentleman fought in the English Army in the Crimean War, and forty-five years later his son was a member of the Queensland Mounted Infantry in the South African War. Included in the actions in which he participated were the Relief of Mafeking and Seige of Eland's River, and is the holder of the South African Medal and five clasps. After the conclusion of hostilities and his return to Queensland, Mr. Deshon was one of a picked body of Australian troops specially selected to visit England on behalf of the Commonwealth Government to take part in the celebrations at the coronation of King Edward VII.

NOTHING LEFT TO GUESS WORK.

Writing (4th July, 1927) from Oakey to renew his subscription a farmer reader says:—"The Journal is worth having as the work and doings of the experts of the Department are printed in the book, and as they leave nothing to guess work and chance it should be instructive to anyone on the land."

Plate 29.—Mr. A. P. Deshon,
Manager of the Queensland Agricultural Bank.

THE BRENNAN BUTTER BOX.

The butter trade of Australia to-day stands as an important and growing feature in our commercial life. With the grazing potentialities of this country, Australian butter should, in the near future, attain a foremost place in the world's market. This development will, of course, demand unremitting attention to ensure a high-grade article which is the first essential to establishing a reputation. The great distance to be covered and the time taken in shipping overseas is, of course, a handicap. This factor necessitates careful packing and the highest efficiency in refrigeration during transport.

In this respect the Brennan butter box is worthy of consideration, possessing as it does several advantages over the ordinary box. The new box is an invention of Mr. Joe Brennan, a railway employee stationed at Roma Street. For many years Mr. Brennan's duties have been supervising at the railway wharves the loading of butter consigned overseas. Long contact with butter in bulk stimulated his inventive faculties, and the result is the Brennan butter box which has been patented in the Commonwealth and elsewhere.

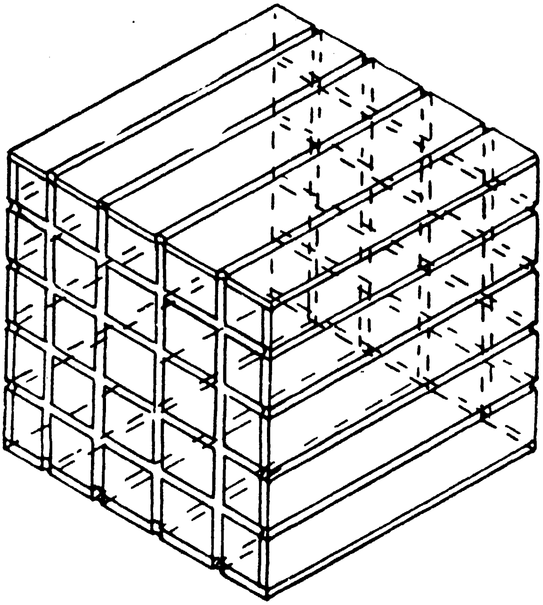


PLATE 30.—BRENNAN'S PATENT BUTTER BOX.

The new box is fitted with grooves running around the outside which constitute air channels, thus ensuring a regular current of chilled air while being refrigerated. The advantage is that the boxes can be stacked solidly in ship's holds. With the ordinary box, butter must be stacked in tiers with laths between to allow free circulation. This means using extra space which sends up the cost of freight. The new box saves space amounting to 800 boxes in every 20,000 shipped, the saving in freight works out about 3d. per box. The cost of laths and working time of laying same, and the expense of clearing the débris when unloading, is also eradicated. It is claimed further that the regular system of air channels insures the maintenance of an even temperature with less refrigeration. Breakages are claimed to be less, the grooved sides furnishing a safer hold when handling than the ordinary smooth-sided box. The butter is landed in better condition which effects the sale price and stabilises a reputation.

A test shipment of butter in the Brennan boxes was forwarded per s.s. "Woodarra" to London under the auspices of the Kingston Butter Factory. Test temperatures taken when shipped and after landing, and the condition of the butter, showed to the advantage of the new box. The consignment was landed 100 per cent. intact, which is a record.

For some time arrangements have been in preparation for the wholesale manufacture of the patent boxes. The matter is now finalised, and an unlimited supply is available on demand. Orders are being executed for several of the leading factories in this State. The Brennan Company is optimistic regarding the future of the boxes, and believes the coming season will see it used almost exclusively by the butter producers of Queensland. Southern interest is marked by inquiries from factories in New South Wales, where the new box is under consideration.

FARM TRACTORS AND THEIR MANAGEMENT.

THE FORCE OF EXPLOSIONS IN THE CYLINDERS.

By E. T. Brown.*

The arguments that have taken place in the past between advocates of horse-power farming and motor-power farming have never as yet got any "forarder," as it is a trait of human nature to stick to one's opinion through thick and thin. But the day was bound to come when definite statistics would be forthcoming relative to the difference in cost between horse and motor farm work, and for this day many of us have been waiting for some time. I do not expect that those who still believe that horses are better than tractors for farm work will accept the proof of the latter's superiority without question, but the figures that I give below are certain to make them sit up and think. The following figures may be taken as authentic and reliable, as they were published by the British Ministry of Agriculture.

Comparative Costs.

The tests that were carried out dealt with harvest work and the results are those of work actually done with the harvesting of 10 acres of oats. Four devices were employed in the test—namely, (1) a horse-drawn binder, (2) a tractor-drawn binder, (3) a tractor-drawn two-binder, and (4) a tractor-drawn binder and stooker. The last-mentioned device—namely, the stooker—is of American origin and its performance is sensational. It is a rather unwieldy looking machine, but it can be manipulated with rapidity, and that it does remarkably good work was admitted by everyone that saw it at work. Without going into too many details as regards time occupied by the different devices when cutting and binding the 10 acres set for the test, the following particulars will give all the information that is necessary. The horse-drawn binder required five men for cutting and stooking, the cost of cutting being 30s. 4d. and for stooking 14s. 1d., making a total of 44s. 5d. The tractor-drawn binder required eight men for the dual work, the cost being 18s. 4d. and 16s. 9d. respectively, making a total of 35s. 1d. The tractor-drawn two-binders required seven men, costing 12s. 8d. and 14s. 4d. respectively with a total of 27s. The tractor-drawn binder and stooker required only two men throughout the whole work, the time occupied being six and three-quarter hours at a total cost of 13s. 7d.

The Need for Good Materials.

Many prospective tractor buyers cannot for the life of them make out why a farm tractor should cost such a lot of money in the first place, and why the price of important spare parts is so considerable; but when one begins to learn something as regards what goes on the moment an explosion occurs in the cylinder, it is realised at once that the reason for the supposed high cost is that only the very finest materials can be used successfully for the various working parts. I think, however, by giving you a few figures I will be able to prove to you that the cost is justified. Let us take the case of a 20-horse power engine, having two cylinders —6.5-in. by 8-in.—with a normal speed of 500 revolutions a minute. The head of the piston in this case is 33.2 square inch, and the average explosion pressure is somewhere in the neighbourhood of 250 lb. to the square inch. In many instances the explosion pressure is considerably more than that given, but the 250 lb. will answer my purpose of explanation. From these figures it will be seen that whenever an explosion occurs the piston head in question receives a blow of close on 4 tons. But in a two-cylinder engine, with a normal speed of 500 revolutions, the two piston heads between them experience 500 such blows each minute. This will give some indication as to the strength of the parts if they are to encounter 250 such blows, or nearly 1,000 tons a minute.

---

* In "The Farmer and Settler."

All Parts Concerned.

It is true that the piston head received this blow in the first place, but all other working parts of the engine are affected thereby. From the piston the blow is passed on through the connecting rod, with the big and little end bearings, to the crankshaft. Each time that the blow is passed on it loses some of its intensity, but for all this the strain that is imposed on the crankshaft has to withstand 500 such blows a minute. Is it any wonder, therefore, that every part of the engine must be constructed of those metals that are able to bear the strain?

How Pressure is Determined.

It has been stated that the explosion pressure is generally about 250 lb. to the square inch. Some of you may wonder how it is possible to determine this when an engine is at work. It is, of course, a job for the engineer in his shop, and it is not one that can be carried out by everybody. To obtain the pressure a special device is employed which is attached to the cylinder. The indicator, as it is called, draws on a card by means of pencil lines, and this indicates exactly what is happening inside the cylinder. The pressure inside the cylinder moves the pencil up and down against a spring, so that when the pressure is high the pencil moves in the same direction. The movement of the piston up and down causes the paper on the drum to move backwards and forwards, and in this way four lines are drawn to correspond with the four movements of the piston. When the pressure has been determined it is only a matter of arithmetic to work out the temperature within. It is a known fact that the temperature rises in a definite relationship to the increase in pressure and, therefore, the calculation is not a difficult one.

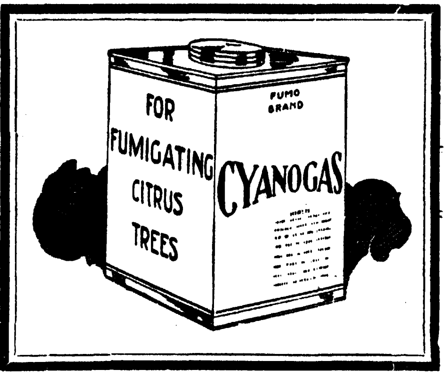
CITRUS CULTURE—SUCCESSFUL EXPERIMENTS.

Thus a recent Press message from Nambour:—About twelve months ago the Department of Agriculture undertook experiments on the orchard of Mr. J. T. Tennant, at Mapleton, in the revitalising of orange trees which showed loss of vigour after having been in bearing for some years. The entire work was done by departmental officials, from the pruning, spraying, and treatment to the first application of the fertilizers. Fifty trees in one portion of the orchard were selected, after close inspection of the root systems. This work occupied some weeks, when Mr. Tennant continued with the fertilizers, which were selected according to the nature of the soils. There is now seen on those trees one of the finest crops of oranges along the Blackall Range. The navel variety has especially responded to the treatment. The cost has worked out at 8s. per tree for the twelve months. Mr. Tennant states that before any orchardist attempted to carry out similar work it would be necessary to closely examine the root system of each tree, for there would only be waste of time and money on trees where the roots had lost vitality. The intention is to treat other portions of the orchard in a similar manner. Orange trees which were not showing live root action have been uprooted, and are being replaced with young trees. For the time being those portions are also being planted with pineapples.

Commenting on this the Acting Director of Fruit Culture, Mr. Geo. Williams, remarked that a rather high percentage of orange trees in the Mapleton district have in recent years shown indications of stagnation and more or less decay. Measures calculated to effect improvement have from time to time been recommended, but not received in the way that the general condition of the trees warranted. It was consequently decided that the fact of the application of the treatment advised be demonstrated and a small portion of Mr. Tennant's orchard selected for the purpose. The trees in this plot, estimated to be about fourteen years planted, were of very indifferent appearance and carrying many decaying and dead branches, poor, yellow foliage, and were practically unproductive. In addition to severe pruning in the first instance and subsequently thinning out young growth, the following soil treatment was applied:—Pulverised lime stone at the rate of 2 tons per acre and Nauru phosphate at the rate of 16 cwt. per acre, broadcasted and worked into the soil, followed by an application to each tree of 5 lb. sulphate of potash and 5 lb. sulphate of ammonia (25th June); a subsequent application (25th December) 4 lb. each of potash and sulphate of ammonia; third application (26th July) 3 lb. superphosphate, 2 lb. sulphate of ammonia, 1½ lb. potash. It is considered advisable that applications after the first liberal dressing be made twice annually.

CYANOGAS

(CALCIUM CYANIDE)



It is the Gas that kills them

Cyanogas is a dust which when brought into contact with the air releases hydrocyanic acid gas—the deadliest gas known. It positively KILLS every living insect.

Cyanogas has been proved to be the only effectual remedy for—

BANANA THRIP, all Scale Insects infesting Orange Trees, including PINK WAX, RED, BROWN, MUSCELL, Etc. WHITE LOUSE, GREEN ORANGE BUG and any insect that breathes.

We carry in stock large supplies of—
PARADICHLOROBENZENE, ARSENATE OF LEAD, PARIS GREEN, BLACK LEAF 40, "HARBAS" RED OIL, "HAROLA" LIME AND SULPHUR, WEED KILLER, BORDEAUX MIXTURE, BLIGHTY

And the most efficient means of combating Vegetable, Cane, Cotton, and Orchard pests. Also a complete range of SPRAY PUMPS and DUSTERS by the world's most renowned manufacturers.

This department of our business is in the capable hands of an instructor lately associated with the Hawkesbury College, N.S.W.

Consult us on your agricultural problems. Catalogue H.13 free on request.

BUZACOTTS (Q'ld.) LTD.

373A ADELAIDE STREET, BRISBANE.

Model 16 Silky Oak. Sixteen Guineas

Notwithstanding the many improved makes of machines offered for sale there is nothing on the market to-day that can

On Real Merit deprive the

Symphona

of its claim to Supremacy

There is an Unassailable Scientific Reason

Extract from a letter received frcm a well-known Sydney Musical Enthusiast—

> "I had no difficulty in unpacking and setting up the Symphona The moment of starting was rather an exciting one for me as my judgment of tone value was new to be judged, but the first tones re-assured me, as I listened I was satisfied. It is all I thought it to be as I listened in your warehouse, and it got my folk much as it got me."

Symphonas are to be found in a number [illegible] New South Wales musical homes. We want you to hear it.

KING & KING

LIMITED

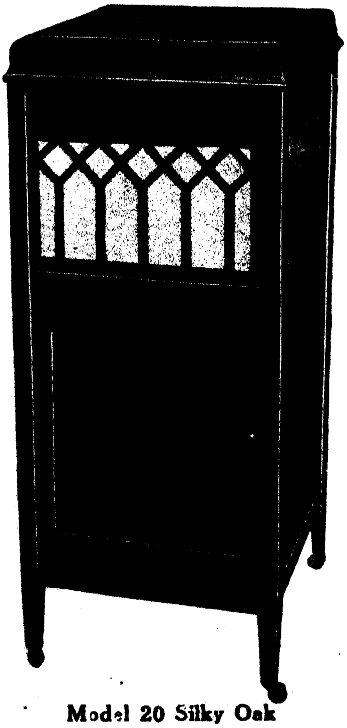
Music Warehouse
Queen St., Brisbane

Patentees and Manufacturers of the

Symphona

TABLE MODELS—
£4 to 12 guineas
CONSOLE MODELS—
16 to 85 guineas
CABINET MODELS—
20 to 63 guineas

Write for illustrations giving detail, particulars of prices, material and equipment. We CANNOT illustrate the TONE, you MUST hear it for yourself. When in Town, call and ask for a demonstration.



Model 20 Silky Oak
Twenty Guineas

POULTRY RAISING.

By P. RUMBALL, Poultry Expert.

Poultry farming on a commercial scale is an active, healthy, open-air life, calling for intelligence and application to detail rather than muscular effort. On a small scale it readily fits in with the general operations of the mixed farmer, the dairyman, and the orchardist, proving at times one of the main sources of revenue. In this article Mr. Rumball makes a general survey of the development and progress of the industry.—Ed.

Not the least important rural industry in Queensland is that of poultry raising. Its true value is estimated at considerably over £1,000,000 annually, but there is still room for further development, and persons desirous of taking up any rural industry should give serious consideration to the claims of poultry farming.

It is an occupation that is suited either to men or women. Though the latter are at a disadvantage with respect to the general building up of a plant, it often happens that by closer attention to details they may be more successful than men. It is, however, not an occupation that can be entered into as a sole means of support, as many think, with little capital. Certainly many of our foremost breeders commenced operations with little or no capital, but they passed through many of the struggles of the pioneer, and often had to seek outside work. It is not the writer's intention to encourage those lacking in finance, knowledge, or an aptitude for detail to embark into extensive operation, but rather to start in a small way, extending operations as they gain knowledge, experience, and finance, or in other words start right by making your fowls pay their way and build up the farm.

The poultry industry throughout the world has taken many years to grow to what it is to-day, and it also has passed through many trying stages. Possibly one of the earliest purposes for which poultry were especially bred was that of cock-fighting. Then we may say the next phase was that of exhibition. For many years now the breeding of poultry as a hobby and for exhibition purposes has been and still is extensively practised. The breeding of poultry for purely show purposes was not found to be a method which led to the extensive development of the industry, as the stock were principally selected for type and feather and little thought given to the commercial feature of egg production. This phase of the industry's development was, however, responsible for many benefits. Fanciers had to learn to breed for type and feather markings, &c. They had to be observant, and the self-training they received well fitted them for the rather difficult question of selection and breeding for egg production, and many of our foremost breeders have come from the ranks of the fancier. Again, the fancier is largely responsible for the maintenance of the type of various breeds. It was also the fancier's paying undue attention to certain features for show purposes and not enough to the commercial side of poultry keeping, the production of eggs, that was largely responsible for the establishment of egg-laying competitions.

Egg-laying competitions were commenced many years ago in practically all the States. Some were conducted by the various State Governments, and others by poultry clubs formed for the purpose of promoting the development of the industry. This may be termed the third stage through which the industry has passed. This State is well provided with egg-laying tests—one being conducted by the Department of Public Lands at Mount Gravatt, one by the National Utility Poultry Breeders' Association at Nundah, one by the Darling Downs Poultry Club, one by the Gympie Poultry Club, and one by the Bundaberg Poultry Club.

These tests have greatly stimulated the breeding and selection of stock for egg production, and it is largely due to these tests that the Commonwealth now has a poultry industry which is worth over £10,000,000 annually, and capable of exporting £250,000 worth of eggs. The tests have also been a wonderful advertisement to Australia, as the records created have attracted the attention of breeders throughout

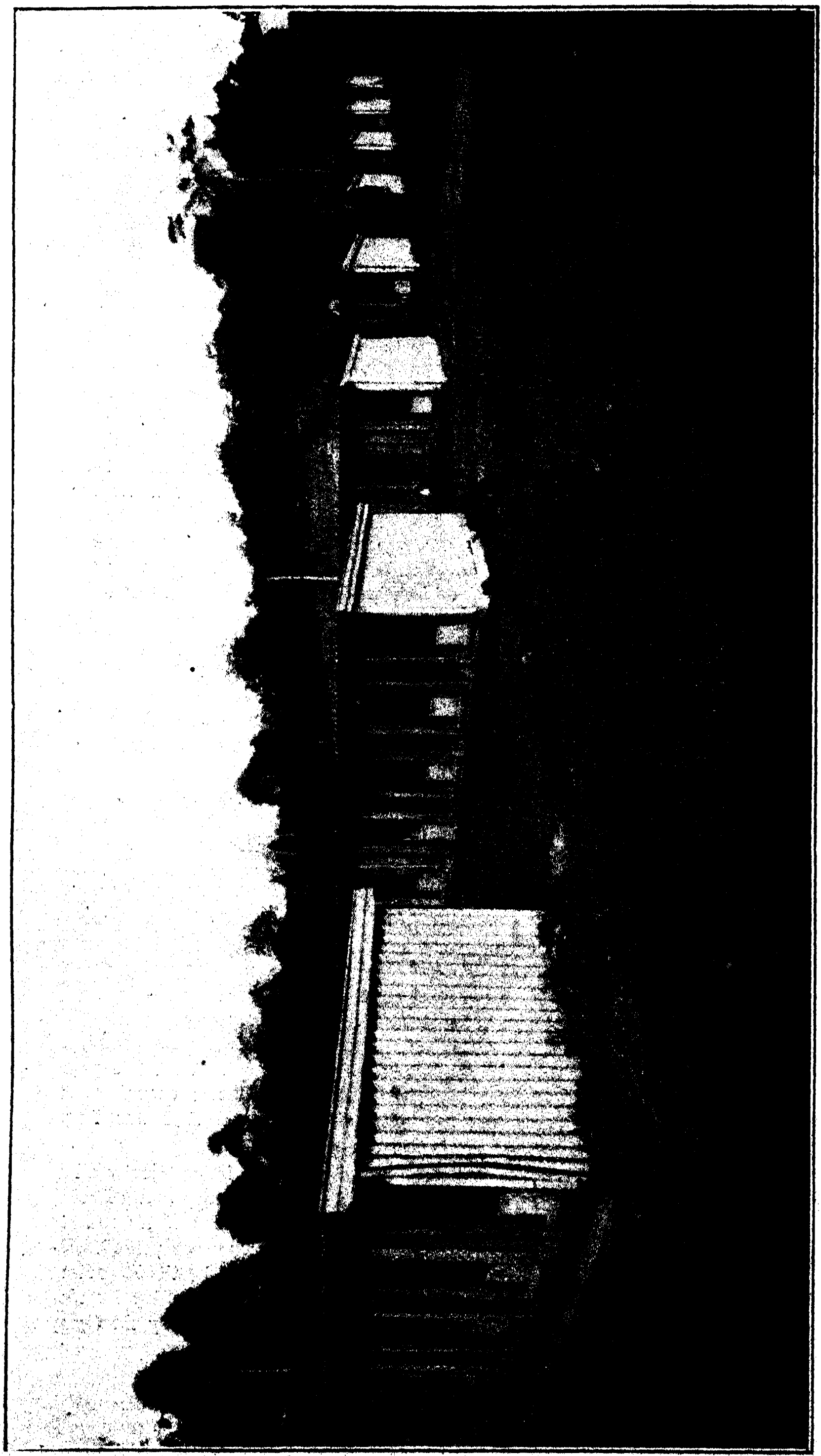


PLATE 31.—MOUNT GRAVATT EGG-LAYING COMPETITION PENS.

The venue of a Competition conducted by the Department of Public Lands in connection with their Soldier Settlement operations.

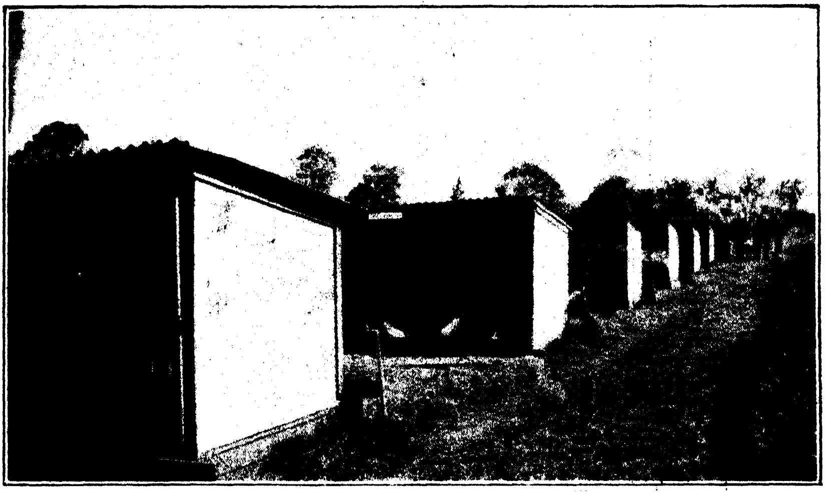


Plate 32.—Competition Pens of the Queensland Branch of the National Utility Poultry Breeders' Association at Nundah.

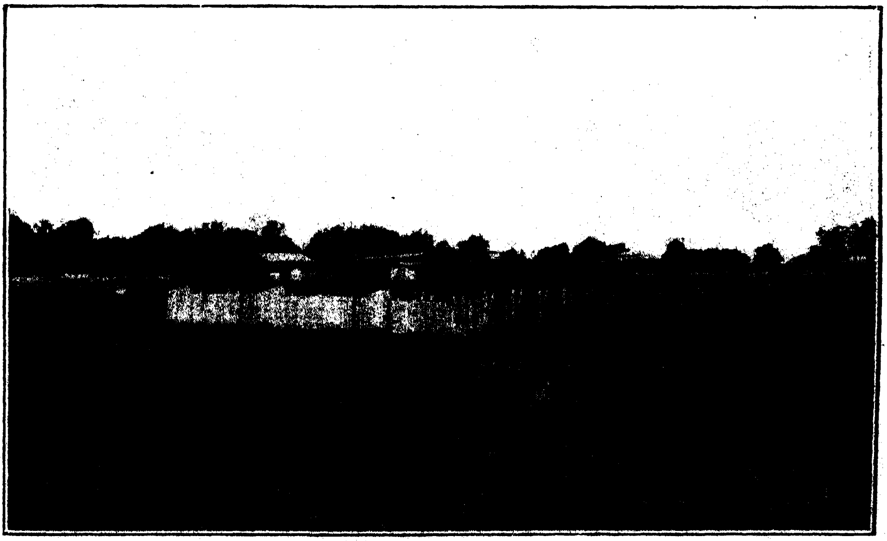


Plate 33.—Competition Pens of Darling Downs' Single Test Egg-laying Competition.

It was here that the Queensland Record for Egg Production was obtained when a Black Orpington Hen laid 354 Eggs in twelve months.

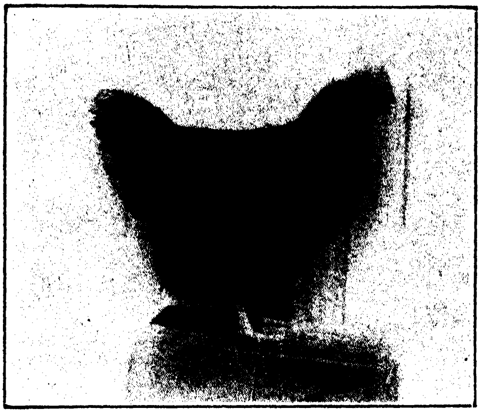


PLATE 34.—R. BURN'S "WARWICK WONDER" BLACK ORPINGTON.
Laid 354 2¼-oz. Eggs in 365 days in Darling Downs Egg-laying Competition, 1926–27.

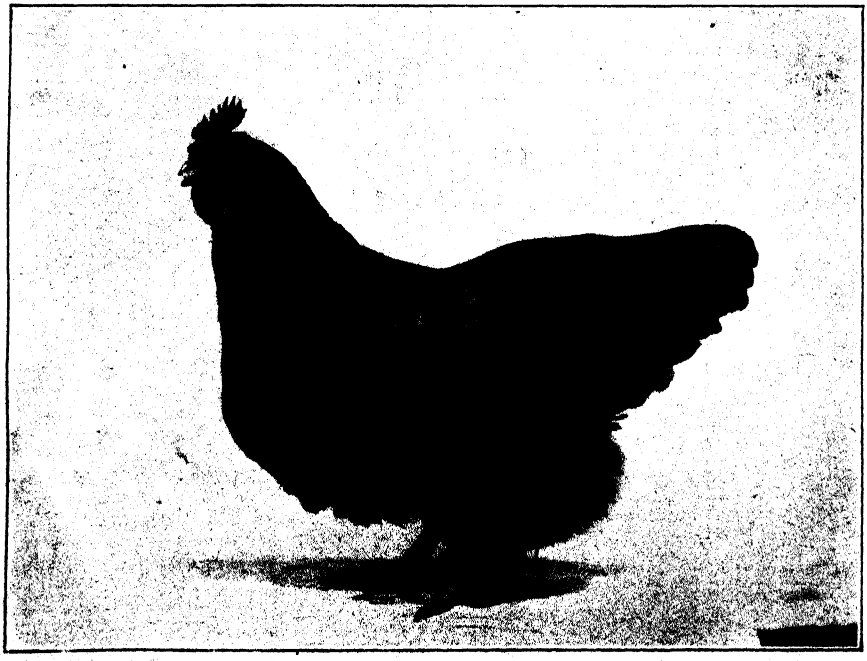
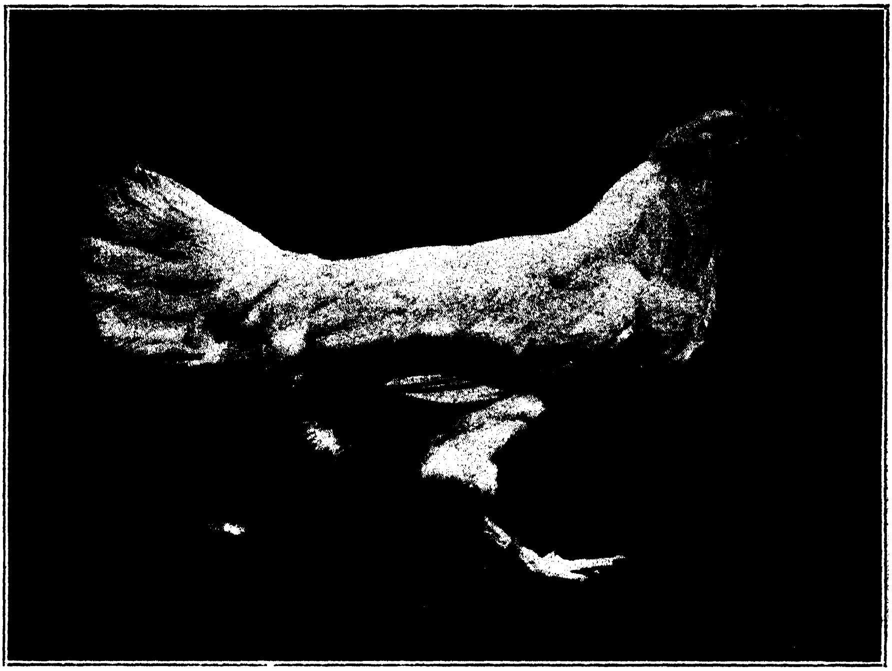


PLATE 35.—BLACK ORPINGTON WHICH LAID 274 EGGS AT THE 1926–27 COMPETITION AT MOUNT GRAVATT.



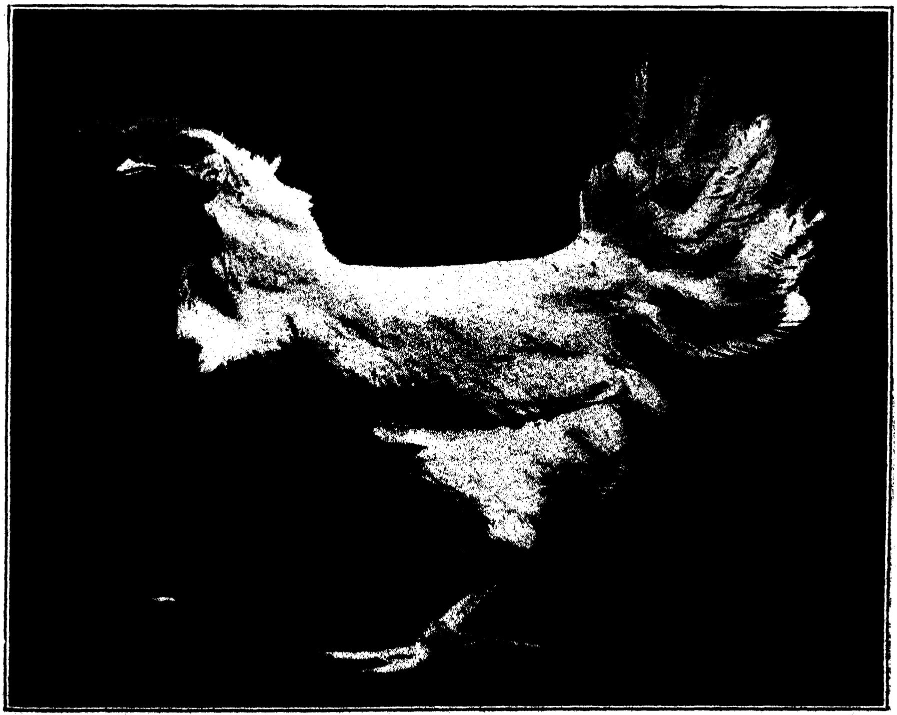


Plate 36.—Two White Leghorns which competed in the Mount Gravatt Test, 1926-1927.

Both hens laid 278 Eggs, and carry splendid type.

the world, and it is probable that the exports of stud poultry rates second only to that of our sheep. To breeders in Australia they indicate a reliable source of obtaining stock, the progeny of which carries the feature of high egg production. Although the distribution of stock from this source has been carried on now for many years, there has been practically a constant improvement in the quality of the birds, and careful breeders still make a practice of selecting stock from breeders who indicate the quality of their birds by public competition.

The published returns of egg yields, egg values, cost of feeding and profit over cost of feeding, has also provided interesting reading, and undoubtedly induced many farmers to consider the results they obtain from their own stock and make purchases of birds of better breeding. The methods of feeding to obtain these results have also undoubtedly demonstrated to the farmer the necessity of giving this question greater consideration, and not to treat his birds as merely scavengers of the farm and expect results.

Even with the improvement that has taken place with the breeding, feeding, and distribution of stock the reproduction of the better class of bird was not as rapid as desired owing to the difficulty of obtaining broody hens. Certainly artificial incubation had been in use on commercial poultry farms for many years, but the mixed farmer had quite sufficient worries without adding incubators to them, and this work was left to the broody hen.

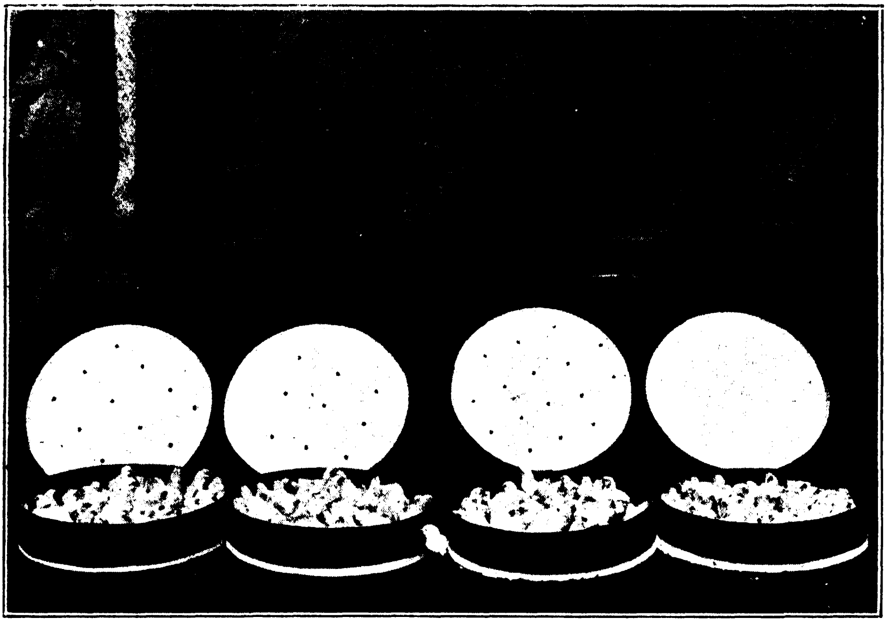


PLATE 37.—THE FRUITS OF INCUBATION.

Four hundred chickens opened up on a farm in the Cleveland District. All but sixteen were reared to maturity. Chickens packed similarly to these will travel well and experience no ill result. Two days' journey should, however, be the limit.

Broodiness had been a trait largely bred out of many of the best varieties of stock, and it was increasingly difficult for the farmer to obtain a sufficient number of broody hens and to obtain them during the period most suitable for breeding purposes.

The above condition now has largely been overcome with the advent of the mammoth incubators and the possibility of purchasing day-old chickens, and may be termed the fourth stage.

These large hatcheries or incubators make it practical for breeders to specialise in the production of chickens for sale as day-old chickens, it being merely necessary for them to retain sufficient chicks for the replenishment of their studs. One man alone operating a large incubator can turn out 50,000 or more chickens according to the facilities provided. Many poultry farmers commence by purchasing 1,000 or more chickens from these large plants, while others again never bother to put in incubators, being satisfied to purchase chickens every year. To the agriculturist or general mixed farmer, large concerns similar to that illustrated are of considerable advantage as they enable him to obtain a given number of chickens on a certain date and therefore are to him what the small incubators are to the poultry farmer. This means of reproduction and distribution of stock has undoubtedly hastened the development of the industry in Queensland, and will ultimately if kept on a sound basis bring poultry raising into the foremost ranks of our rural industries.

The expanse and development of the industry as stated has naturally meant that production has increased by leaps and bounds. In the first place birds that possibly laid only about 100 eggs yearly have been replaced with those that are capable of producing 200 or more. Methods of feeding, which (say) were only 50 per cent. efficient, have been increased (say) 90 per cent., while it cannot be denied that the poultry population has also increased. Although eggs are produced throughout the whole of the year, production is stimulated during the spring and warmer months. This production has become in many countries so heavy that various organisations have had to be set up with the object of stabilising the industry, and Queensland has been faced with a similar condition. In this State the position has largely been overcome by the creation of an Egg Pool and consequently by the

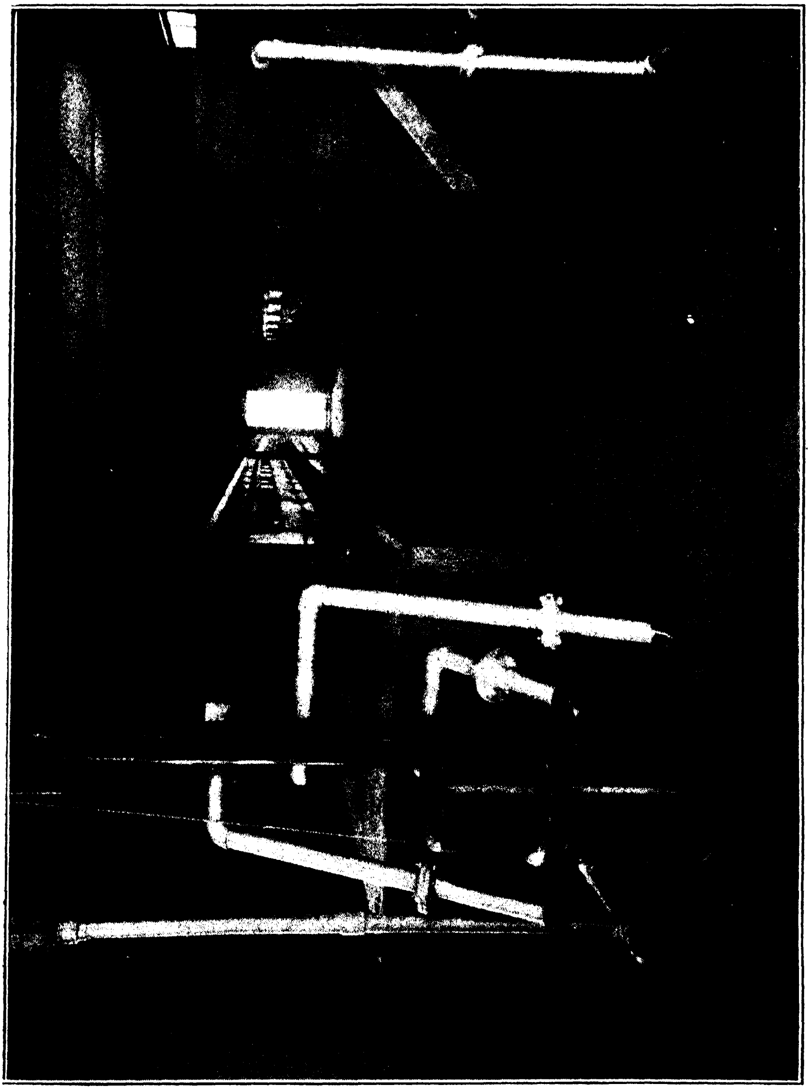


PLATE 38.—ONE OF THE LARGEST HATCHERIES IN QUEENSLAND.

There are three incubators here capable of holding 18,000 eggs. The total number of chickens hatched annually exceeds 40,000. These machines are heated by a coke fire and the eggs automatically turned. The room where these machines are operated is 60 ft. long and 20 ft. wide, and no space wasted.

co-ordination of the efforts of merchants and producers. An illustration of the fruits of organised marketing is given, and from this producers should realise the magnitude of the task of egg marketing.

From the foregoing an idea can be gathered of the developing of the industry in Queensland, and of the energy and knowledge that must have been applied to build it to what it is to-day. Although the building process has necessitated the passing through various phases it is not conceded that any can be dispensed with, but rather that efforts displayed by various clubs, breeders, &c., be conducted with the object of improving or at least maintaining what we already have.

The fancier or showman still needs his show, but certain features in his stock should not be encouraged. He should strive to introduce utility into the various varieties of poultry kept by him.

The management of the various egg-laying competitions should take greater note of type, be more severe, if possible, in the question of size of egg, and endeavour to make more use of tested hens by a better distribution of their male progeny.

Large hatcheries must not content themselves with just selling chickens. The chickens should be the progeny of hens laying standard-sized eggs, true to type, and if not the first descendants at least the second of tested parents. No finer opportunity exists for the distribution of stock of the best quality than is offered by these large hatcheries, but at the same time without constant care and attention on the part of the breeder the chickens sold could easily be worthless.

PLATE 39.

The illustration depicts the loading on board ship of portion of a consignment of 50 tons of eggs shipped per s.s. Jervis Bay to London during the early part of 1927. It represents, together with previous shipments, the results of the initial organisation of the export of poultry products to overseas markets.

The question of marketing is every producer's business. To sell our produce we must retain the consumer's confidence. Quality of the internal content, size, and cleanliness of the egg, are of primary importance in obtaining and retaining this confidence, and every producer's attention is directed to this feature.

The Department of Agriculture and Stock is at all times prepared to give the poultry breeder every assistance possible, and with the object of assisting in the direction illustrated articles have been prepared upon the following subjects and may be had free upon application:—

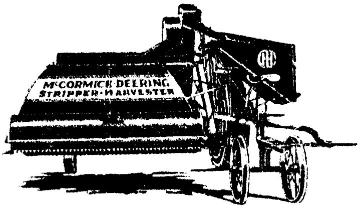
Poultry Housing; Utility Poultry Standard; Poultry Feeding; Fattening Poultry; Rearing and Feeding Chickens; Handling and Marketing of Eggs; Storage of Eggs; Distended Abdomen in Poultry; Marketing Table Poultry; Incubation; Caponizing; Poultry for the Fruitgrower; Parasitic Worms; Poultry Tick; Chicken Pox; Roup or Contagious Catarrh; Post-mortem of Poultry; and Anomalies in Egg Production.

"Good equipment makes a good farmer better"

McCORMICK-DEERING

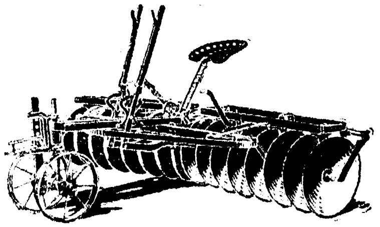
FARM MACHINES

There is a machine for every conceivable farm requirement in the McCormick-Deering line of farm machines. Practical in design and sturdy in construction McCormick-Deering Farm Machines are known throughout the world by their ability to give service and satisfaction whatever kind of work they are used for.



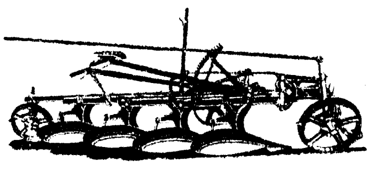
STRIPPER-HARVESTERS

The McCormick-Deering Stripper-Harvester is specially designed to meet Australian conditions. Will strip clean at all times, even if the crop is tangled or down. A machine that will give efficient and trouble-free service year after year.



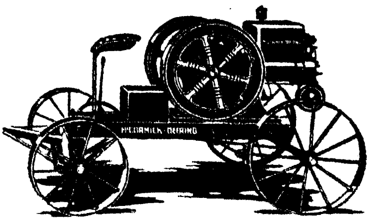
HARROWS

The McCormick-Deering line includes disc harrows, spring-tooth harrows and peg-tooth harrows in horse and tractor styles. Special types for orchard work, cotton and sugar plantation, etc.



PLOWS

Single or multi-furrow. Disc or mould-board. Stump-jump or set. Whatever size or type of farm, orchard or vineyard plow you require, you will find it in the McCormick-Deering line. Special types for tractor work.

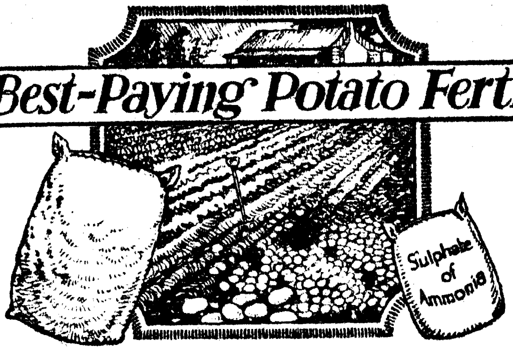


KEROSENE ENGINES'

The McCormick-Deering Engine will deliver sturdy, dependable power for all your jobs at minimum cost. Made in 1½, 3, 6, and 10 H.P. sizes. Fitted with removable cylinder, gravity-feed mixer, built-in magneto, throttle governor, etc.

International Harvester Company of Australia Pty. Ltd.

278-294 Roma St. BRISBANE
229-231 Castlereagh St. SYDNEY
543-555 Bourke St. MELBOURNE
113-4 North Terrace ADELAIDE
RICHARD PURSER & CO., BASSENDEAN, AGENTS FOR W.A.
ROBT. NETTLEFOLD PTY. LTD., HOBART, AGENTS FOR TAS.



The Best-Paying Potato Fertiliser

Once again Sulphate of Ammonia has demonstrated its advantages for potato growing. The published results of a three years' manurial trial conducted by Mr. J. T. Ramsay, potato expert to the Victorian Government, show that combinations of Sulphate of Ammonia and superphosphates, and Sulphate of Ammonia and potash invariably gave the heaviest yield and the biggest money increase per acre.

These trials are all the more noteworthy because of the fact that the types of soil varied from swampy peat to red volcanic.

The foregoing particulars furnish additional proof of our claim that Sulphate of Ammonia makes potato growing a better paying proposition.

THE AUSTRALIAN GAS LIGHT COMPANY
Haymarket, Sydney.

THE BROKEN HILL PTY. COMPANY LTD.
O'Connell Street, Sydney.

THE NORTH SHORE GAS COMPANY LTD.
Corner Blue and Miller Streets, North Sydney.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JUNE, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1927.	June, 1926.
North Coast.				
	In.		In.	In.
Atherton	1·58	26	4·07	1·55
Cairns	2·86	45	1·84	1·15
Cardwell	2·02	55	4·81	0·54
Cooktown	2·03	51	1·80	3·23
Herberton	1·00	40	3·45	0·36
Ingham	2·31	35	4·35	0·52
Innisfail	7·14	46	10·96	4·19
Mossman	2·10	14	2·65	1·00
Townsville	1·27	56	4·17	1·06
Central Coast.				
Ayr	1·33	40	5·19	0·13
Bowen	1·59	56	4·46	0·32
Charters Towers ...	1·27	45	3·45	0·18
Mackay	2·69	56	3·29	1·43
Proserpine	3·46	24	4·29	1·01
St. Lawrence ...	2·45	56	1·82	1·36
South Coast.				
Biggenden	2·08	28	2·44	2·23
Bundaberg	2·76	44	3·26	1·17
Brisbane	2·77	76	3·21	5·32
Caboolture	2·64	40	2·75	5·55
Childers	2·40	32	4·01	4·17
Crohamhurst ...	4·42	35	4·05	6·56
Esk	2·16	40	3·57	3·66
Gayndah	1·85	56	1·82	0·89
Gympie	2·64	57	2·91	3·61
Kilkivan	2·15	48	2·14	2·28
Maryborough ...	2·94	55	3·96	2·59
South Coast—continued:	In.		In.	In.
Nambour	3·67	31	3·37	5·33
Nanango	2·04	45	2·94	2·33
Rockhampton ...	2·17	40	3·97	0·65
Woodford ...	2·86	40	3·15	5·06
Darling Downs.				
Dalby	1·68	57	3·37	1·54
Emu Vale ...	1·45	31	2·68	1·54
Jimbour	1·70	39	3·18	2·21
Miles	1·87	42	1·68	1·01
Stanthorpe ...	1·89	54	2·71	1·49
Toowoomba ...	2·42	55	4·12	3·49
Warwick	1·77	62	2·83	1·35
Maranoa.				
Roma	1·67	53	0·93	0·76
State Farms, &c.				
Bungeworgorai ...	1·63	13	0·96	0·94
Gatton College ...	1·83	27	2·68	2·30
Gindie	1·56	27	0·67	0·15
Hermitage ...	1·87	20	2·99	1·82
Kairi	1·47	12	2·43	1·68
Sugar Experiment Station, Mackay	2·42	29	3·08	1·51
Warren	2·29	12	3·14	1·50

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, has been taken from the "International Review of the Science and Practice of Agriculture," published at Rome by the International Institute of Agriculture.

What Size of Holding Gives the Best Results?

RUSTON, ARTHUR G.: Small Holdings. "Transactions of the Highland and Agricultural Society of Scotland," Fifth Series, vol. xxxviii. Edinburgh, 1926.

Examining the question "What size of holding is likely to give the best results for the nation as a whole, the community at large, and the individual farmer concerned?" in the light of figures collected in Switzerland by Dr. Laur, in Denmark by Dr. Larsen, and in Yorkshire by the Department of Agriculture of Leeds University, Dr. Arthur Rushton arrives at the following conclusions:—

If the time comes when Great Britain must as far as possible be self-supporting in the matter of food supply, it is undoubtedly the small holding that is wanted. The figures of Dr. Larsen show that the gross output per acre of the small holding under 25 acres is nearly double that of the larger farms. The results of Dr. Laur also show that the gross output per acre steadily decreases as the size of the holding increases. The results obtained from the study of a limited number of small holdings in Yorkshire show that the gross output on small holdings of every type is invariably high on the acreage basis, but not necessarily so per man employed. The Danish results show that the output per man employed increases as the size of the holding increases.

The figures of Dr. Larsen show that the small holding employs a larger number of men per hundred acres than the large holding. The Swiss and Yorkshire results confirm those of Dr. Larsen, but indicate that the small holding has the possible economic disadvantage of a high labour bill per acre.

The individual farmer, however, will look at the matter from the personal rather than the impersonal point of view, and the economic rather than the social point of view will appeal to him. Here the Danish figures are instructive as they reveal the fact that the small holding of approximately 20 acres, so common in Denmark, is not the most economic unit. It is handicapped by high capitalisation, particularly in the form of non-productive capital, by high working costs, by the uneconomic employment of labour, both man and horse, to such an extent as more than to over-balance the social advantages it enjoys. When once the land has been acquired, buildings must be erected, and working capital found before that land can be efficiently farmed. In the case of the small holding under 25 acres the total capital to be invested in the farm is approximately three and a-half times the value of the land, but in the case of a holding of 250 acres it is roughly twice the value of the land. The big increase in the capitalisation of the smaller farms is largely in the form of buildings, implements, and what may be looked upon to a certain extent as non-productive capital.

While the data for Yorkshire are somewhat scanty, such as are available show that, as in Denmark and Switzerland, the small holder has to bear the same handicap of high working capitalisation, particularly in the form of implements and dead stock.

From the economic standpoint, it is not so much the gross output that matters as the net. While the output from the small holding is undoubtedly high the production cost of that output is also high. The Danish and Swiss results show this, and the more limited data collected in Yorkshire show results which are strictly in agreement. The high rent and rates which are inseparable from small holdings, their high labour and other costs, add heavily to the cost of production of their home-grown foods, and these high costs of production of crops react upon the cost of upkeep of the stock consuming them.

After allowing for a normal interest on the capital invested in the holding, and charging the labour of the small holder at the normal rate paid to the hired man, the Danish figures show that during the seven years 1917-23, there was an average yearly deficit of 4s. per acre on the small holding under 26 acres. The efficiency of the holding increased with its size up to a maximum which was reached on farms between 75 and 100 acres in area, on which a surplus of 30s. per acre was obtained, and then fell off steadily as the holding increased, the surplus on farms of over 250 acres being approximately £1 per acre.

In Switzerland the holdings are, on the average, smaller even than in Denmark, and Dr. Laur's results show that in spite of the high gross output from the holdings under 12½ acres, the average net profits obtained on them were less than 3 per cent. on the capital outlay, as compared with more than 5½ per cent. in the case of holdings of more than 75 acres, from which it would appear that the efficiency of the normal holding increases with its size certainly up to 75 acres.

The results obtained from a more detailed study of a smaller number of farms in Yorkshire go to show that maximum efficiency is reached on a holding of between 100 and 150 acres, though the data available are not sufficient for the evidence to that effect to be conclusive. There are indications that the efficiency of holdings falls again as they increase beyond 100 to 150 acres, and then again rises until they are about 350 acres, from which point it appears to fall as the holdings increase in size beyond that limit.

From a study of the variations in the number of holdings of various sizes in England and Wales, it results that the tendency has been in the direction of the gradual elimination of the large holdings and also of those which have been found in practice to be too small for economic working. In spite of the repeated efforts made to encourage the small-holding movement, economic forces have slowly but surely worked in the direction of the medium-sized farm of about 100 acres.

Dr. Rushton also examines the cost to the responsible authorities of creating and maintaining small holdings in England and Wales, and his conclusion is that the present small-holding system has been to a large extent a costly failure, mainly through following too slavishly the methods that have been adopted in other, mostly smaller, countries. He recommends that no man should be placed on a holding of less than 35 acres; that the responsible authorities should hesitate to put any man on a holding of less than 50 acres; that the working of the Small Holdings Act should be extended so as to make it applicable at least to holdings of 75 acres and that, wherever possible, the holdings supplied should be close to that limit; and, lastly, that the men to be placed upon the holdings should be carefully selected.

Farm Costings Investigation in New Zealand.

Fawcett, E. J.: Farm Economics, Work of New Branch of Fields Division. "New Zealand Journal of Agriculture," vol. xxxiii., Nos. 2 and 6. Wellington, 20th August and 20th December, 1926.

A Farm Economics Branch of the Fields Division of the New Zealand Department of Agriculture has recently been established. The programme of work adopted falls under two heads: (1) A farm survey questionnaire is being issued to a large number of farms of every type; (2) a certain number of selected farms in each district are being subjected to a very accurate system of costing, with a view to forming a standard against which the replies to the questionnaire can be checked.

On the basis of the data obtained, it is hoped that at least some of the following problems will prove capable of solution:—

(1) Some farms of a group controlled by a certain combination of factors show a profit, others of the same group a loss. How far can the management of the low-producing farms be modified so as to improve returns?

(2) What is the minimum capital essential for undertaking a farm of any given size in any locality?

(3) Is the crippling factor usually the high price of land, high rates and taxes, over-capitalisation, or faulty management?

(4) What is the earning value of land under average management skill on different types of soil in different localities under average marketing conditions?

The general conception underlying the projected work of the Farm Economics Branch is that the true economy of the matter is first to rectify farming conditions and only after that has been done to give attention to the other important questions of the relation of producer to the ultimate consumer.

The work is at present confined to (1) a survey of mixed farming in Canterbury; (2) investigations into the cost of producing: (*a*) wool and meat, taking account also of the relation between the two products; (*b*) butter-fat. In every case the endeavour is to study the whole farm as a unit, rather than to follow a detailed system of cost accounting.

Studies in Atmospheric Electricity.

C. NEGRO. "Elettricità atmosferica." Milan, 1926. One vol. in 8°, pp. 299, 40 plates. U. Hoepli.

Atmospheric electricity is nowadays once again attracting the attention of physicists, and our present knowledge on the subject is set forth by the author in eight chapters. We have still much to learn, only to mention, for example, the atmospheric disturbances brought about by the transmission of radio.

The chapters are entitled as follows:—The earth electric field; Atmospheric ions; Electricity in precipitations; Radio-activity of precipitations; Storm electric phenomena; Telluric currents and polar auroras; Various hypotheses; Atmospherics in radio-telegraphy.

An appendix contains studies on atmospheric electricity in Italy; there is also an extract of reports on atmospheric electricity arising out of the observations made at the R. Istituto Superiore, Florence.

The volume is of interest not only to theorists but also to practical men on account of the different questions relating to hail, lightning, &c., of which it treats.

ONION GROWING.

In response to numerous requests the following notes on onion growing are reprinted from the Journal of April, 1920:—

There is no reason why onions should be imported in such quantities as we see often arriving by steamer from the Southern States. The climate here is perfectly adapted to them, and, if only planted on suitable soil and given the necessary attention, heavy crops are an almost certain result. At one time it used to be said that onions could not be profitably grown as a field crop in the Blenheim district, near Laidley. To disprove this, the writer determined to experiment on the sandy loam of the scrub land on Sandy Creek. The seed was sown in April; the variety, Brown Spanish. The land to which they were to be transplanted was well worked and then rolled to make a hard, compact bed. Transplanting was carried on throughout July, and the season having proved favourable the result was a heavy crop of magnificent bulbs, which gave a splendid return for the labour expended. Now, if such a result can be obtained by one farmer, it follows that others can do the same. As there are thousands of acres of similar land under cultivation both there and in many other portions of the State, it only requires determination on the part of the farmers to enable them to successfully displace the importations from the South.

On looking over an old diary of farm operations, it appears that the writer's crops averaged 6 tons per acre, and sold at £25 per ton. Are there many crops which will give a like return? The present price of onions in the market is about £17 per ton. Now, suppose a crop to yield 8 tons per acre (and we know that double that return has been made), the cash return for a medium crop will amount to £136. Certainly there is a considerable amount of labour involved in planting out an acre or two of onions, but that labour is amply compensated for by the net returns.

A consideration of the following notes, based on practical experience, may, therefore, be of some service. Let us first consider

The Soil.

The most suitable soil for onions is a rich sandy loam, such as that of the Blenheim scrubs—free, friable, and easy to work, a soil that will not cake, and not lying so low as to retain the superabundant moisture after heavy rains. In such a case the land should be well drained. An eastern or south-eastern aspect has been proved to be better than if the land sloped to the west, as the onion does not require intense heat to bring it to perfection.

Before sowing the seed, it is important that the seed beds should be clear of weeds and of their fallen seeds. By sowing in April or May, there is not much to fear from weeds; still, it is advisable that the land, both of the seed beds and of the area proposed to be planted out, should be turned up and exposed to the weather for some time previous to sowing. As soon as the weeds appear, give the land a good scuffling, and if this be done two or three times between March and April there will be no trouble afterwards. If the soil be not virgin scrub, or if it has borne crops for many years in succession without manuring, it should be thoroughly well manured with stable dung, ashes, bonedust, &c., as the onion demands plenty and the best of nourishment. New scrub land is rich enough in natural fertilizers not to require any addition of manure.

Preparing the Soil.

In planting out onions a very serious mistake is often made, and that is, the soil is carefully worked, reduced to a fine tilth, and the plants are set out in a soil which is loosened to a depth of perhaps 8 inches. From land prepared in this manner no good results need be expected. The onion requires a firm bed; otherwise the plant, instead of making a large well-shaped bulb, will run to neck, and have more the appearance of a leek than of an onion. Therefore, the land before being planted must be well solidified by rolling.

The Seed Bed.

Onions may be sown broadcast, or they may be drilled in, or they may be sown in a seed bed and afterwards planted out in the same manner as cabbages. The best way is to drill them in. In this case, about 2 lb. of seed per acre will be required. The seeds must be dropped at a distance of about 2 inches apart in the drill, and the drills should be from 12 inches to 15 inches distant from each other. The plants will afterwards require thinning out with the hoe. When sowing in a seed bed, planting out must be resorted to—a tedious process, but one that pays well for doing well.

On rich soil the plants may be 6 inches apart. The drills should be slightly raised, and the roots of the plant firmly embedded in it—allow the bulb to, as it were, squat on, not under the surface. As the plant grows, the soil must be kept perfectly clear of weeds, and, where the working of the ground has thrown the soil against the bulbs, it must be drawn down, so that only the root is in the ground. Where this has not been attended to, the remedy for the resulting want of bulb formation is to wring the necks of the plants, or, at least, to bend them down with a twist. This will have the effect of inducing the formation of bulbs.

When sowing the seed, care should be taken that they are not covered to more than their own depth. If sown deep, many seeds fail to germinate, and most of those that do appear will make an abnormal growth of neck, causing much labour in drawing away the soil from the incipient bulbs. The writer has never sown onions broadcast, and therefore offers no opinion on the value of the method. Of course more seed would be required per acre, and, if weeds are troublesome, a good deal of hand work would be necessary.

Now, about the seed. There are few seeds so annoyingly deceptive as onion seed. So difficult was it to get good seed in the State even at 10s. per lb. in the good old days, that growers imported it from Spain. The largest growers at Oxley, Messrs. Martindale and Nosworthy, were most successful with imported seed, but the writer had a very bad experience in this business. Twenty pounds weight of onion seed was sent from a friend in Germany. Instead of packing it in hermetically sealed bottles, he stowed it in calico bags in the body of an immense wooden Swiss cuckoo clock. When the clock was opened the bags of seed were examined, and looked perfect in colour and shape; but, alas! when subjected to pressure, no oily fatness was perceived; and when at last it was given a chance and sown thickly in drills, five acres returned the magnificent yield of 72 lb., which, at the rate of £28 per ton, amounted to 18s. Certainly, the land, after a week's waiting for the seed to germinate, was utilised otherwise, but not 1 cwt. of onions was harvested.

Make sure, therefore, of the seed. After sowing, it should germinate in less than a week.

In former days large onions were always aimed at, but now the public taste is in favour of medium-sized bulbs, so that closer planting may be adopted.

Onions may be known to be ripe by the drying up of the tops. As soon as this happens, take them up by hand and leave them on the ground between the rows to dry. As soon as they are dry, carry them carefully with as little bruising as possible to the barn.

As before stated, the Brown Spanish has proved most successful in this State, but the gentlemen above mentioned grew what they called the large White Portugal onion. It certainly was a splendid bulb, and fetched very high prices in the markets of Brisbane, Maryborough, and Rockhampton.

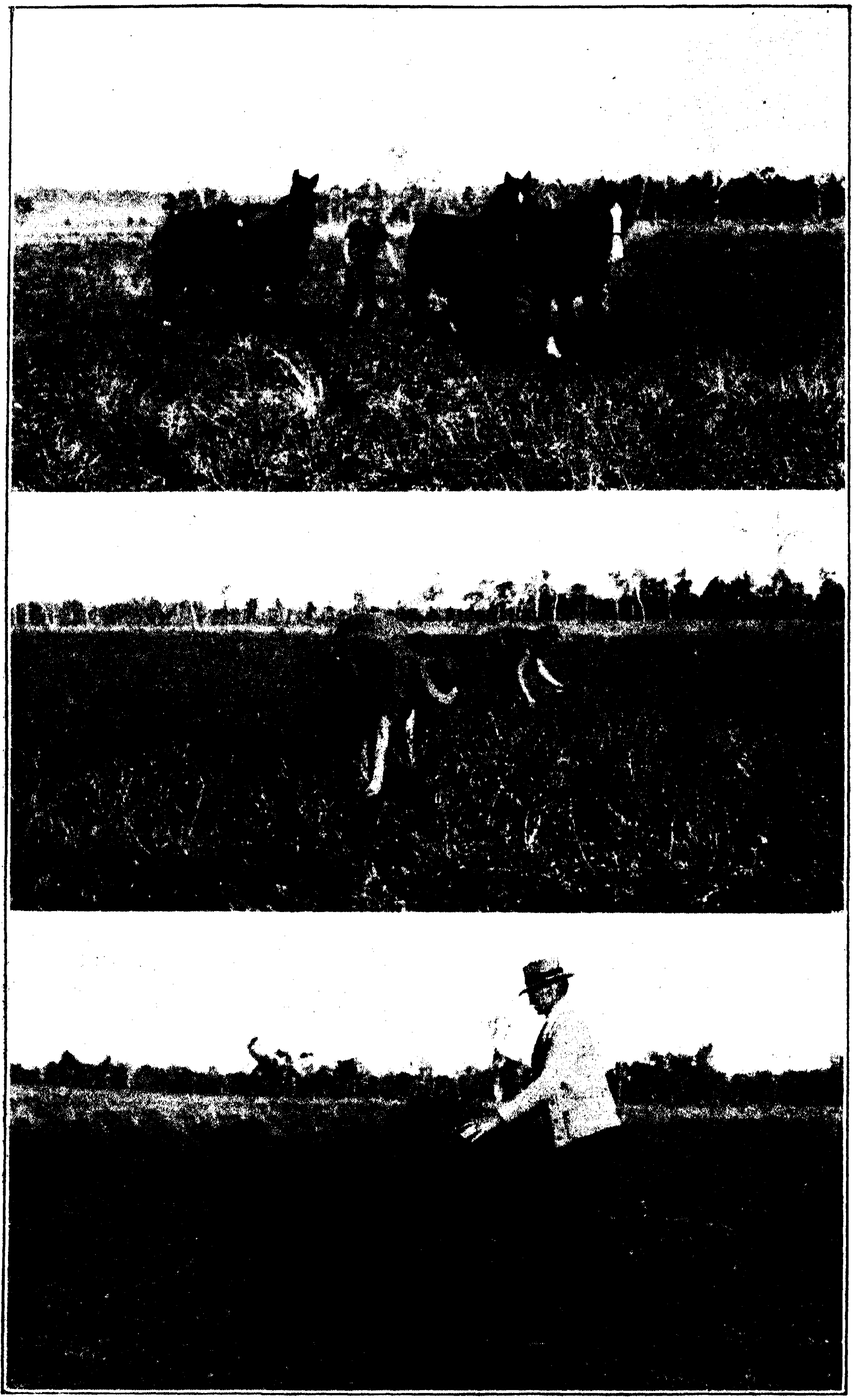


Photo.: Department of Agriculture and Stock.]

PLATE 40.—PEANUT INDUSTRY—MR. J. CAVANAGH'S FARM, WOOROOLIN, KINGAROY LINE.

(1) Ploughing peanuts prior to stacking. (2) Lifting peanut roots for stacking.
(3) Stacking peanuts (Mr. J. Cavanagh, a well-known South Burnett pioneer, in the picture).

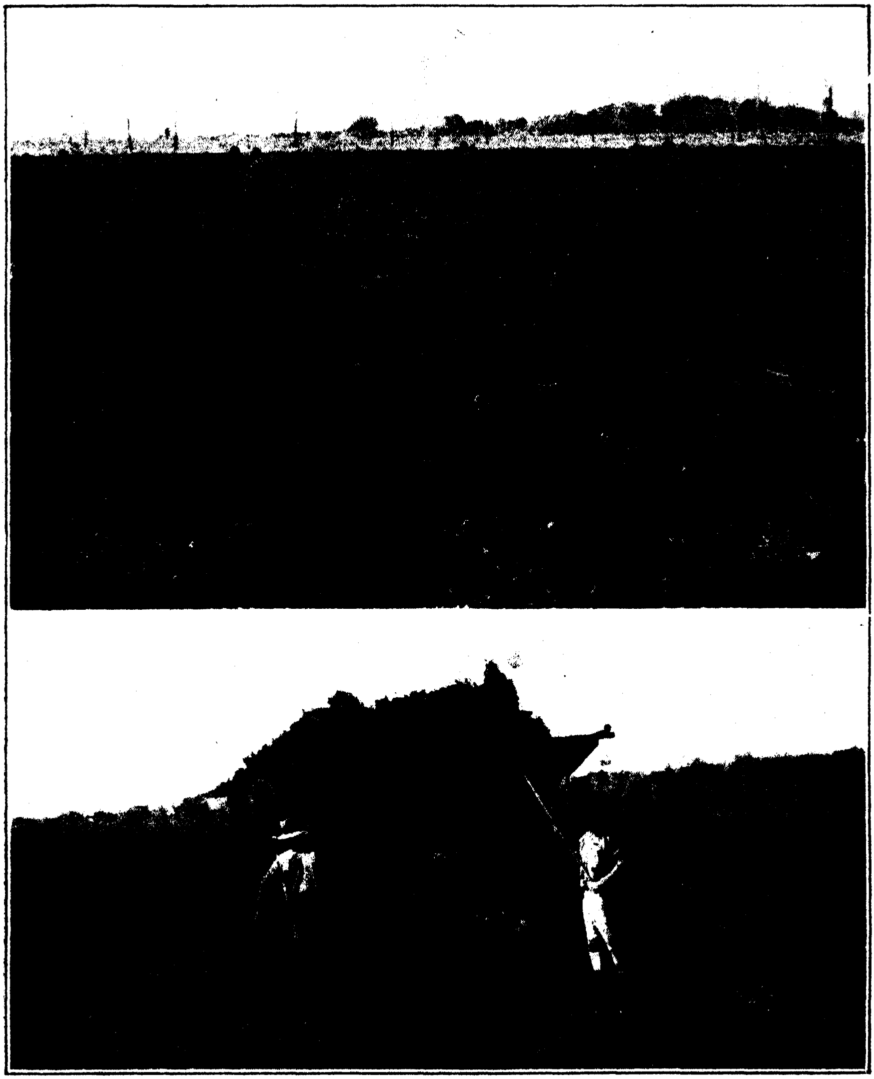


Photo.: Department of Agriculture and Stock.]

PLATE 41.—PEANUT INDUSTRY, KINGAROY.

(1) Field of peanuts stacked for carting to thresher on Mr. B. Young's farm, Memerambi.

(2) Carting peanuts to thresher on Mr. J. Cavanagh's farm, Wooroolin.

Photo.: Department of Agriculture and Stock, Brisbane.]

PLATE 42.—THRESHING PEANUTS, MEMERAMBI, KINGAROY.

Photo.: Department of Agriculture and Stock.]

PLATE 43.—PEANUTS IN THE SHELL, GRADED FOR SALE.

Photo.: Department of Agriculture and Stock, Brisbane.

PLATE 44.—PEANUTS—GRADED KERNELS READY FOR MARKET.

POINTS IN PLANT PROPAGATION.

By GEO. WILLIAMS, Acting Director of Fruit Culture.*

Plants are propagated for new individuals by seeds and for the multiplication of those previously raised so that the exact characteristics may be maintained by cuttings, layers, divisions, suckers, budding, and grafting, &c.

Propagation by seed is the most universal mode and that common to all plants in their natural state, and generally it is the most advantageous method with the average garden plant except where the exact counterpart of the parent is required. For successful propagation by seeds several conditions are essential—briefly that the seeds have perfectly matured, that they have been properly stored until the period of sowing, and that they be sown at the right time in a manner most conducive to germination. Regarding the perfection and maturity of seeds, the microscope in skilful hands will detect imperfections not observable to the naked eye, but a germination test is by far the most reliable. So much variation exists amongst the seeds of different plants that stored conditions which may prove fatal to one may not affect the germination of others. For the ordinary garden varieties, placing when in a reasonably dry state in insect-proof receptacles and storing in a cool place are recognised as being the most efficacious. Some of the larger seeds soon lose their vitality under any conditions, but more particularly dry and various materials are used to retain moisture during distant transit; a mixture of fibre dust and charcoal receives most favour, and though the process of germination is frequently well advanced on opening the container, losses in careful hands are nil.

Seed Sowing.

The theory that the most favourable time for sowing seeds is when they naturally drop from the plants in their country of origin is not applicable in other climates. Favoured by suitable weather, seeds of more tropical plants may vegetate in autumn and grow slowly through the winter, but in many cases they would perish during the colder months unless special provision be made for their preservation; whereas if the seeds are well kept and sown in the spring the young plants will progress as conditions become more favourable to their growth. In the absence of cultivation, the time when seeds are self-sown may be accepted as the most suitable for perpetuating the species, but the cultivator has other objects which render it necessary to deviate from the natural mode. He has to cultivate not only for reproduction but for use or ornament and to meet demands existing perhaps through the year, under climatic conditions differing materially from those prevailing in the country of origin of the crop. Generally garden seeds require no preparation for sowing, though some like those of the carrot, which adhere to each other, are improved in distribution by being rubbed between the hands along with dry sand. Others which are encased in hard coverings should be steeped in water until their covering is materially softened; and those of an excessively hard nature, instanced in some Acacias, are improved by placing in a cup of hot water—up to boiling point—poured on them and allowed to remain immersed therein overnight. The germination of legumes is accelerated by soaking in cool water for about six hours before planting.

---

* From a radio lecture broadcast from 4QG Brisbane.

Methods of Sowing.

There are two principal modes of sowing—broadcast or in drills or rows. Broadcasting, doubtless the most original, is merely scattering the seeds over the surface. The drill system has the advantage of admitting of the ground being more expeditiously cleaned and stirred at intervals, which is very necessary in soils of a close nature, particularly after heavy rains. On the other hand, small plants with spreading roots are probably best disposed promiscuously. Where transplanting is practised the drill method, excepting perhaps where very fine seed is used, is recommended. In their natural state seeds rarely fall upon the bare ground, but amongst the decayed or decaying vegetable matter with which it is covered. In this the seeds vegetate and the young plants are nourished by it until the roots acquire strength to penetrate the loam. Though seeds will vegetate under the influences of heat and moisture a fertile soil is essential for further progress. The constituency of the soil is also a most important feature. Fine light rich soil or a compost containing leaf mould is favourable to the vegetation of most seeds.

Germination.

The term "germination" is applied to the series of phenomena through which a seed passes when, having arrived at a state of maturity and placed in favourable circumstances, it swells, bursts its envelopes, and tends to develop the embryo which it contains. Before a seed can germinate, there must be a concurrence of circumstances favourable and essential to this process. The external agents essential to germination are water, heat, and air. Water is absolutely necessary for producing vegetation and the phenomena of nutrition in plants. In germination it penetrates into the substance of the seed, softens its envelopes, causes the embryo to swell, and produces changes in the nature of the first leaf or leaves which often render them fitted for supplying the young plant with the first material of its nutrition. It contributes to the development of the plant by means of the decomposition which it undergoes. Its disunited elements combine with carbon and give rise to the various principles found in plants. The quantity, however, must not be too great or the seeds would undergo a sort of maurotion and their germinative faculty be destroyed. Heat is no less essential to germination; seeds placed in a temperature below zero exhibit no germinative action. The heat, however, must not exceed certain limits, otherwise instead of favouring the development of the germs it will dry them up and destroy their vital principle.

Air is also indispensable, for were a seed totally withdrawn from its contact it would undergo no process of development. Certain substances have a decided influence in accelerating germination. Humboldt demonstrated that seeds of the cultivated cress when placed in a solution of chlorine germinated in five or six hours, whereas if placed in pure water they occupied thirty-six hours to attain the same state. Certain exotic seed which had resisted every method which had been tried to make them germinate became perfectly developed in a solution of the same substance. He further observed that all substances which readily yield a part of their oxygen to water, such as nitric and sulphuric acids sufficiently diluted, accelerated the evolution of seeds, but at the same time would have the effect of quickly destroying their vitality.

Light, instead of accelerating germination, rather retards it. Seeds germinate more rapidly under shade than when exposed to sunlight. The time occupied before an appreciable extent of germination varies widely, and whilst with some varieties it occupies but two days, others may not be evidenced for two years.

Seed-bed Practice.

The young plants for ordinary garden or nursery work are, with few exceptions, raised in seed-beds specially prepared for the purpose, with such facilities for shading as may be necessary or are available. The necessity for a friable fertile soil has been mentioned. This is not always available, particularly in heavy soils, which are invariably disposed to encrust on the surface, much to the detriment of the young plants. The addition of sufficient leaf-mould or decomposed organic manure and fine sand will effect the necessary alteration, but these are not always convenient in sufficient quantity, when a generous application of freshly slaked lime—up to 4 or 5 lb. per yard—thoroughly incorporated with the surface soil some months before planting, is recommended—a fine tilth and good cultivation are most desirable. Shade is an important consideration in starting fine seeds—particularly when it is desired to raise plants very early in their season or what is considered out of season. The shade should not, however, for garden plants be of a permanent nature, particularly such as would be accorded by opaque fixtures not growing in bushhouses, excepting where free access can be given to light for some time prior to transplanting. Whatever material is used to provide shade it will be found that the closer this is to the ground—allowance must be made for watering—the less watering is required and a more even moisture maintained. This is particularly desirable in the case of small seeds, which are usually evenly distributed on the soil surface, which is then firmly pressed down with the back of a flat spade or substitute, and very fine loam scattered lightly over the surface, water being applied with a fine distributor so that the seeds are not disturbed. In deciding upon the form of shade to be provided, consideration should be given to the possibility of loss or damage through the effect of heavy rains. The effect in respect of excessive moisture is obviated by raised beds and the action of the lime where required upon the soil. On the whole a fabric covering for seed-beds is preferable to brush or small boughs. Following germination it can be removed or rolled up in the afternoon, and the young plants (excepting under likelihood of heavy rain) allowed to remain exposed during early morning, the time of exposure being gradually extended with development until the cover can be completely removed. Following its removal plants should be allowed to remain for a fortnight or longer, according to their stage of development and general conditions, before considering transplanting. It will be recognised that sufficient even moisture must be maintained to assist development, but prior to transplanting the supply should be withheld for two or three days to allow the growth to harden, or liberal application be made before removals, so that the soil will break up readily without taking the roots with its particles.

Except with very fine seeds producing delicate plants, the open ground, if in good form, will be sufficient in cool weather to ensure a fairly good germination, but the seed-bed and transplanting is almost invariably preferable to broadcasting seeds over beds where the plants are to be allowed to remain. Admitted, there are a few but very few which do not readily transplant, and the quantities of these required would be limited, and be accommodated by raising them in the smallest sized flower-pots, filled with suitable soil and plunged to the rim in a part of the seed-bed where one watering will cover the whole supply, and transferred from the pots to their permanent positions without any fear of failures—a feature always present in planting seeds where the plants are to remain.

A MOST VALUED PUBLICATION.

A Chinchilla farmer in renewing his subscription writes (8th July, 1927):—"The little Journal is a most valued and useful publication for the man on the land, so I do not like to miss it."

"A GREAT HELP."

Thus an Elimbah farmer (18th July, 1927): "Kindly continue forwarding the 'Queensland Agricultural Journal.' It sure has been a great help to me since coming to this land of sunshine and fair play."

Buy

RELIABLE TYPEWRITERS

from a

RELIABLE FIRM.

We are Sole Agents for—

L. C. SMITH silent ball-bearing Typewriters
CORONA - - Portable Typewriters
GESTETNER - All British Duplicators
DALTON - - Adding Machines
MARCHANT - Calculating Machines

WE also have a large stock of second-hand Typewriters of all makes, thoroughly reliable, fully guaranteed, and at prices from £5 to £20. Terms from £1 deposit and £1 monthly can be arranged to suit clients. Everything we sell is fully guaranteed. Write for particulars.

ESTABLISHED 1903

MACDOUGALLS LTD.

(formerly Australian Typewriter Supplies Co.)

363-365 Queen Street

BRISBANE

Box 345

'Phone: 717-718

There is Money in Trees!

By Investing in the Largest Commercial Company in the World.

N.Z. Perpetual Forests Ltd.

PAID UP CAPITAL	£128,650
BOND CAPITAL EXCEEDS	£2,250,000
TRUSTEE RESERVE FUNDS representing One-third on all fully paid Bonds to 1st July, 1927	£52,641

Like all Successful Companies, Imitators speedily arrive, therefore the **public are warned** *not to confuse the securities and protection of the*

N.Z. PERPETUAL FORESTRY Ltd.

with any other Forestry Company.

Write for Illustrated Booklet.

Smith, Wylie & Co. Ltd., Griffith House, Brisbane.

Name……………………………………………………

Address……………………………………………………

The People's Own!

State Government Insurance Office

Total Amount Paid in Claims for Year 1925-1926—**£462,747.**

Transacts FIRE, LIFE, MARINE, and ACCIDENT Insurance on Best Possible Terms.

Branches and Agencies throughout the State.
Head Office: George and Elizabeth Streets, Brisbane.

JOHN A. WATSON,
Commissioner.

FLUKE IN SHEEP.

Recent investigations have indicated that chemically pure carbon tetrachloride is an efficient drug for use against fluke in sheep. Tests in this State, and in America and England, have proved this new cure to be in every way superior to and cheaper than the male fern extract drench previously advocated.

While this latter drench costs something like 6¾d. per sheep, the carbon tetrachloride given in capsule form amounts to one penny, and in drench form (one part carbon tetrachloride to four parts medicinal liquid parrafin) one-third of a penny per sheep treated.

Prevention First.

The use of a highly efficient cure, however, has a certain disadvantage. The more nearly a cure approaches 100 per cent. perfection—and the carbon tetrachloride treatment comes near to that mark—the greater is the risk of sheepmen neglecting the practice of prevention, because of the false sense of security that a "perfect" cure is likely to give.

Preventive measures should always be regarded as the first line of defence against fluke, while the "100 per cent." cure should be regarded as a very handy reserve force to be drawn upon only when the first line of defence has broken down.

Life History.

Before outlining preventive measures, it might be explained that the fluke commences egg-laying about three weeks after reaching the liver of the sheep. The thousands of eggs produced by each fluke pass out of the sheep in the fæces, and, if deposited in moisture, will eventually develop into embryos, which are free-swimming, and seek certain fresh-water snails, into which they penetrate, and in the body of which they undergo a second process of multiplication, developing into forms known as *rediæ*. These, again, undergo a process of division, and from each *rediæ* are produced several *cercariæ*.

It will thus be seen that each egg may develop into a large number of *cercariæ*, each of which bores its way out of the snail, and, after swimming about in the water for some time, attaches itself to a blade of grass or some aquatic plant. Here it forms a cyst round itself, and remains quiet until swallowed by some animal. It is therefore, in consuming the herbage of damp pastures that animals become infested. When the attached *cercariæ* reach the intestine, they find their way to the liver, and there develop into fluke, and so complete the life cycle.

Preventive Measures.

Preventive measures must aim at destroying the eggs and embryos of the fluke, the snails which act as an intermediary host, and the *cercariæ* which infest the sheep. The addition of bluestone (copper sulphate) to standing or running water in the proportion of ½ lb. to 4,000 gallons of water will destroy all snails and *cercariæ* in less than forty-eight hours. Infested pastures may be cleaned by spraying with ½ per cent. solution of copper sulphate, but stock should not be allowed to graze until sufficient rain has fallen to clean the grass. Much good may also be done by the following:—

(1) Remove infested sheep to dry pastures; the ova excreted from the sheep will thus be deposited on dry country, and will not develop.

(2) Drain wet and boggy pastures, or fence off. Draining will lower the number of snails, and will safeguard the sheep from feeding over the class of country most likely to be infested.

(3) Burn off pastures. This will destroy large numbers of *cercariæ*, snails, and ova.

(4) Water stock from troughs in preference to ponds and dams.

(5) When possible, dressing the pastures with lime and salt is a very effective measure.

If sheep must be placed on infested pastures, the ill-effects resulting from fluke may be greatly reduced by the following precautions:—

(1) Avoid overstocking. If sheep are compelled to feed on short grass, there is more likelihood of their picking up vigorous *cercariæ*.

(2) Allow all sheep plenty of lick of salt and sulphate of iron, in the proportion of 40 of salt to 1 of sulphate of iron.

—A. and P. Notes, N.S.W. Dept. Ag.

TRADE CLASSIFICATION OF PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

To secure the maximum profit in the production and marketing of various grades of pigs, it is essential that the farmer should have a detailed knowledge of trade classification, and of the requirements of the buyers representing both proprietory and co-operative bacon factories, the fresh pork trade, shop and retail trade, or the general buyer who attends and operates at store or market pig sales. The requirements of fellow farmers who depend to an extent upon the purchase of store pigs for further fattening are worth careful study; while in the stud pig business one needs quite an expert knowledge of the various breeds and of breeding and feeding, together with an equally extensive knowledge of the exhibition of stud pigs at shows, and of the business side of the trade in so far as it relates to membership in the Stud Pig Breeders' Society, correspondence, recording of pedigrees, advertising, despatch of selected pigs, and so on. These and other interesting points are discussed by Mr. Shelton in the following pages—Ed.

To secure the greatest margin of profit in the actual marketing of the animals it is necessary that they be properly developed and "topped up" on suitable and sufficient foods, this especially so three weeks or more before actual despatch, and that at the time of final preparation for marketing they be correctly classified and graded. The final preparation for market is particularly important, as on this so much depends; nothing is more annoying than to see well bred and well fed pigs offered for sale in a filthy condition, covered with mud (and sometimes with parasites such as hog lice) and confined in pens equally muddy, filthy, or dusty.

It is the right of every producer to see that the goods he has to offer for sale are placed before the buyers in the most attractive manner possible, and that they be delivered with all care and expedition to the buyer at point of local or terminal despatch.

Market Classification.

In the actual sale of pigs by public auction or private treaty, a number of different grades are provided for, each of which has its own particular classification, the pigs being graded according to quality, approximate age, estimated or actual live weight or estimated or actual dressed weight (as the case may be), and approximate value.

The following table, which sets forth the names, ages, approximate weight, and value of market pigs will therefore be found very useful as a guide in the actual preparation of these animals for disposal and despatch. The figures quoted are approximate only, as trade requirements vary from time to time, and in different districts, States, and countries; they are quoted more as a guide than as a price schedule.

The demand for pigs of all ages and grades is being well maintained, and there appears to be no occasion to suggest a weakening of the demand, since as yet our local markets are not continuously fully supplied, and as yet we have no regular export of bacon and ham, or of frozen or chilled pork to markets overseas. Indeed, there has been quite an appreciable import of pig products from New Zealand, and this matter is the cause of some concern both here in the North, and in the Southern States; it was to the markets of the Southern States that this imported meat was consigned, though the import has quite an indirect effect on Queensland markets.

Trade Classification, Queensland, August, 1927.

Pigs.

Name or Grade of Animal.	Approximate Age.	Approximate Weight.	Approximate Value per Pig.
Sucker or Sucking Pig	6 weeks ..	15 lb. dressed	10s. to 12s. 6d.
Weaner Pig	8 weeks ..	25 to 30 lb. alive ..	15s. to 20s.
Slip Pig	10 weeks ..	30 to 35 lb. alive ..	20s. to 25s.
Store Pig	12 to 14 weeks	45 lb. alive	20s. to 35s.
Light Porker	4 months ..	50 lb. dressed	40s. to 50s.
Medium Porker	4½ to 5 months	60 to 70 lb dressed ..	50s. to 60s.
Heavy Porker	5 to 5½ months	80 to 85 lb. dressed ..	55s. to 60s.
Light Baconer	5½ to 6 months	86 to 94 lb. dressed ..	55s. to 65s.
Prime or Medium Baconer	6 months ..	95 to 125 lb. dressed ..	65s. to 78s.
Heavy Baconer	Up to 9 months	1st Grade— 126 to 135 lb. dressed 2nd Grade— 136 to 145 lb. dressed 3rd Grade— 145 to 160 lb. dressed	from 50s. to 80s.
Backfatter	Up to 4 to 5 years	Up to 4 cwt. dressed ..	£3 to £4
Stag	Up to 6 to 7 years	Up to 4 cwt. dressed ..	£1 to £3
Chopper	Up to 2 years or more	Up to 3 cwt. dressed or over	£2 to £5
Boar	Over, say, 5 to 6 months	Various weights ...	Boars are of little or no value as "meat" pigs

While it will be noted that values fluctuate a good deal, and while pigs of one grade might readily be included in another and perhaps better grade, it can be taken as a general rule that the principal demand is for the medium or prime weight animal, whether marketed as porkers or baconers, or included in other grades. There is with us here, in the North particularly, a very limited demand for very light porkers or very heavy pigs of any grade. The prime pig in good marketable condition with a firm yet mellow flesh and firm white fat is the one most in demand, and is the one that under normal conditions is the most profitable.

GENERAL DESCRIPTION OF MARKET AND STUD PIGS.

Suckers or Sucking Pigs.

This is a trade class, and includes pigs up to six or even eight weeks old, in good marketable condition and fit for immediate slaughter as "sucking pig" for the week-end, Easter, or Christmas menu, &c. The demand for this class varies considerably with seasonal and local conditions, and is not sufficiently constant or lucrative to warrant being specially catered for by the farmer resident outside the metropolitan or city areas. Pig breeders having this class of pig for sale at Christmas (and "sucking pig" is, where finances will allow, almost a national addition to these menus) can usually dispose of them at remunerative prices with but little trouble. The most popular weight is 15 lb. dressed, although some customers ask for lighter or heavier weight carcases.

Percentage Deduction.

In general the difference between actual live and actual dressed weight—where the animals are weighed, slaughtered, and weighed again within two or three hours—varies from about 18 to 25 per cent. Most factories, however, find it necessary in actual practice and in ordinary routine to deduct much heavier percentages than these, up to 30 per cent. being a common deduction where the time elapsing between weighing alive and weighing when dressed covers twenty-four hours or more, and where there is a good deal of shrinkage in weight, the result of handling, sometimes rough handling, and transport over long distances to destination, and possibly a "rest" period of twenty-four hours more or less between arrival at the factory and actual slaughter.

Further details in regard to this portion of our subject may be had from the pamphlets dealing with "Marketing Pigs," which, together with many other nicely illustrated informative pamphlets on pig raising, are available gratis on application (written or personal) to the Department of Agriculture and Stock, Brisbane, Queensland. The various bacon factories will also be pleased to advise pig raisers in regard to any of these matters, as it is in their interests that their clients should be informed as fully as possible in regard to all matters associated with marketing, &c.

Weaners.

Dealing further with the various grades of pigs, we come to the trade class referred to as weaners. Pigs are usually weaned off the sow at about eight weeks of age. This is the correct age for weaning, though pigs benefit considerably by being allowed to run with the sow until the age of ten weeks. At this age they are sufficiently advanced (or at least they should be) to be able to care for themselves. They should, however, have been taught to feed from a trough when four or five weeks old, so that by the time they are ready for weaning they will be quite accustomed to their own food trough and the class of food on which they are to be fed from then onwards.

PLATE 45.—ALL AMONG THE PIGS.

A Pig Farm Scene in the South. Mr. A. N. White, of the Blakeney Stud, with a group of Poland-China and Berkshire Pigs, in one of the grazing areas attached to the Stud.

Weaners are not a "trade" class in saleyards as far as butchers are concerned, but farmers trade a good deal with these young pigs, though even for this purpose slips or stores are a better line. It is not a good thing to wean pigs off their mother hurriedly and rush them off to the saleyards, as they frequently become so checked in growth as a result of the altered conditions that they fail to develop properly and become slow growers or even "stunted" pigs. Many young pigs are rushed off to the saleyards at six weeks old, and change hands at 15s. to 20s. each, a price that is scarcely a payable one to the buyer, unless he knows how to handle these pigs to prevent a check in their growth. It is but natural for a very young pig to fret for its mother at this age, and this fretting and fuming (crying as it were) all day long soon upsets the animal's nervous and digestive system with ill results. It is preferable to hold young pigs at this age for at least two weeks more before selling, as this enables them to become accustomed to the new conditions and the absence of the sow's milk from the daily menu. Pigs vary a good deal in weight at this age, some exceptionally well grown animals weighing as much as 40 lb. or more alive. However, the general average would be about 25 to 30 lb.

Slips.

After passing through the weaner stage and having been definitely separated from the mother, the young pig next becomes entitled to the trade term of a "slip." This is purely a stock salesman's or stockyard term, indicating that the pig is midway between the weaner and store stage. Many farmers prefer buying slips or stores, and growing and fattening them for market in preference to breeding them. Thus it is that there is usually a fairly keen demand for slips and stores, and thus also it often happens that they realise more in comparison than pigs that have already been fattened as light porkers. A "slip" is not a butcher's pig, and butchers do not handle them, except for fattening purposes. Most country butchers run their own piggeries, and they frequently have pigs of this description for sale. The value varies with the demand, but well developed slips should be worth from 20s. to 25s. or more, if they have been well cared for from birth and are well bred. A little extra care in their preparation for sale and a little advertising as to their breeding, &c., helps considerably.

Plate 46.—An Attractive Trio of Berkshire-Tamworth Cross Baconers, Prize Winners of the Best Quality.

The Property of Mr. P. Fett, of Westbrook Crossing, Queensland. These would be classed as Prime Baconers in the markets of the North, and as Light to Medium Baconers in the markets of the South.

Stores.

Passing through the weaner and slip stages, the young pig next becomes a "store pig," a stockyard term indicating, as it does in most other classes of live stock, that the pig is at an age when the owner must determine the animal's future, whether he or she is to be kept for breeding purposes, to be fattened as a porker, to be still further grown and fattened as a baconer, or to go into the heavier grades, or whether the pigs will be held for a week or two and be resold in the same grade to some other person or firm. The demand for store pigs for fattening purposes continues to increase annually, hence, provided that store pigs are in good, healthy, growing condition and show some breeding and quality, they can usually be disposed of to advantage by public auction at pig saleyards or by private contract, at prices varying from 20s. to 30s., or even 35s. to 40s. each. Store pigs to realise maximum values must be perfectly healthy, show good breeding and type, and be in clean, attractive condition ready for further development and fattening. Any "weedy" sorts or any pigs that have been injured in any way or are smaller than the others in the same pen should not be offered for sale in the same pen, as they will always affect the value of the other pigs offered, or of the better class pigs available. Suburban and metropolitan pig farmers, proprietors of "buttermilk" or "whey" piggeries (*i.e.*, piggeries where buttermilk or whey are the principal items of purchased food) are constantly on the look-out for good lines of store pigs. They usually have no objection to the size or age of the pigs, except that they will not handle weaners or slips if larger pigs are available. The stores they like most are those from five to six months old that have had good opportunity of growth, but that have had little or no fattening food—pigs that with three or four weeks' good "solid" food will "make up" into first-class baconers. For these latter sorts they will frequently pay more in comparison than the farmer can realise for porkers.

It is good business growing store pigs in quantity for sale as such, but one needs to be watchful of the seasons and food supply, otherwise one might be caught with a heavy supply of pigs on hand and little or no (or very expensive) food available. The ideal condition would be growing store pigs on the cheaper country over the ranges, and fattening them on the more expensive country capable of growing corn and other cereals, and root crops, &c., &c., on the coastal areas.

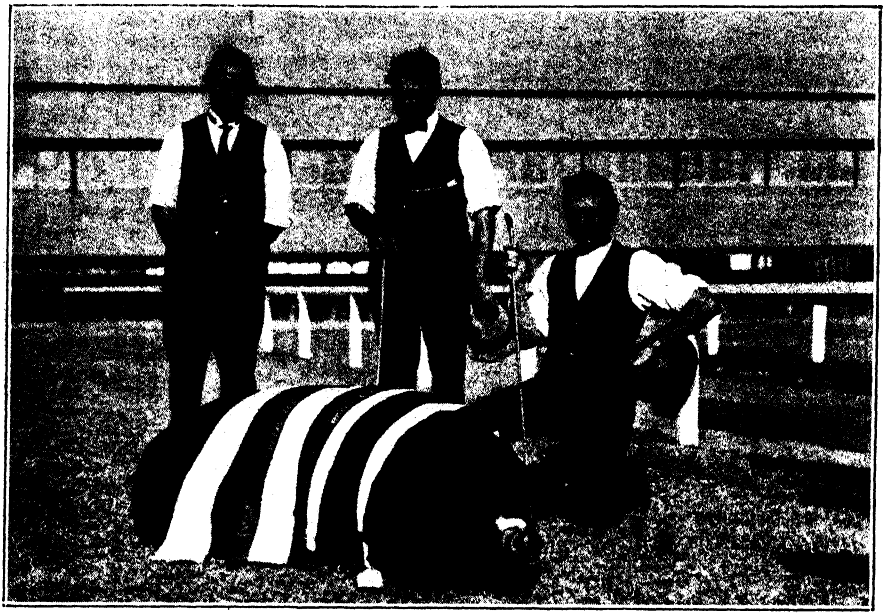


PLATE 47.—THE CHAMPION OF CHAMPIONS.

A unique photograph of that famous Sow "Brentwood Dorothy," now deceased, which sold at public auction, at the Sydney Show Stud Pig Sales, six years ago, at 130 guineas. This sow was a profit-maker of the highest order and was just as good as she looks. The purchasers, Messrs. McPhee Bros., to the right of the picture, are shown in company with Mr. H. J. J. Honey, another Richmond River enthusiast.

Light Porkers.

Good quality well-developed pigs from four to five months old are usually classed as porkers, and they are graded according to weight, quality, and condition into three groups—light, medium (or prime), and heavy.

In the past in Queensland there has not been a sufficiently constant demand for porkers to have warranted farmers catering specially for these grades, but conditions are rapidly changing, and nowadays when the export of frozen pork is being given so much publicity, fresh buyers are offering, and a certain amount of frozen pork has already been shipped from Queensland to ports outside of our own borders and to overseas markets. One firm alone, during 1926, exported 2,800 porkers, purchased here at betwen 7d. and 7¾d. per lb. dressed weight, at weights between 60 and 110 lb. dressed. The pigs arrived at destination in a satisfactory condition, and created a demand for further and almost unlimited supplies. It will be seen, therefore, that the porker grade is becoming an important one. There is, of course, always a certain quantity of fresh pork on the retail markets of this State, especially in the metropolitan area.

It is a mistake for farmers to send porkers to the bacon factory and expect the factory manager to grade them as bacon pigs and pay for them accordingly—that is, unless they are sent in by arrangement with the factories—for even bacon factories have a certain demand for pork, and in the far North the Northern Pig Board handle porkers as well as baconers through the North Queensland Co-operative Bacon Factory. If there is a demand for them at a payable price, porkers, if properly handled, should be more profitable than bacon pigs, as they are ready for market much earlier, and consequently can be produced at a lower price and with less risk. The lighter grades of porkers—say, those dressing about 50 lb. weight—are not as profitable as the prime weight porkers (70 lb. dressed), except to the suburban farmer, who can deliver them to the saleyards or to retailers or consumers in a fresh, clean, prime condition. Porkers cannot stand knocking about to the same extent as pigs carrying more age and weight. To the farmer having porkers for sale the best advice would be to spend some time moving about among pork butchers, stock agents, hotel and cafe proprietors, suburban pig farmers, &c., ascertaining the exact position regarding the market outlet for these animals. See table for ages, weights, and values.

PLATE 48.—AN EXCELLENT QUARTETTE OF BERKSHIRE PORKERS IN PRIME CONDITION.
Note the clean healthy skin and hair, the fine quality and even development of each animal, and the clean comfortable quarters under which they have their abode.

Medium Weight Porkers.

For pigs of 65 to 70 lb. dressed weight there is, especially during the cooler months of the year, a good local demand. They are more profitable than either the lighter or heavier grades, and provided they are in good, healthy condition, will always realise top prices. Butchers prefer porkers weighing 65 lb. dressed if they can secure them regularly, because they are of a convenient and handy "shop" size, and can be cut up to more advantage than other grades. Porkers are, of course, used in the fresh meat business, being retailed in the form of small joints of fresh pork, pork chops, roast pork, and other forms. Many farmers believe that the bacon-curers can handle porkers to cut up for the sausage trade, but this is not the case, except as referred to above, as factory reports will bear out. In the Southern markets there is a heavy demand all the year round for porkers of good quality and of convenient "shop" weights.

Heavy Porkers.

For these the demand is not so keen or constant, nor are prices as satisfactory. Altogether they are not as good for marketing purposes as are the medium weights or the better grades of light bacon pigs. There are times, of course, especially in the South, when heavy porkers sell well, particularly if one or more of the carcass butchers have heavy export orders for carcass pork for the Navy or for pickled pork for the "Island" trade. In general, however, it can be said that the heavy porker is not in demand; he had better be fed for a fortnight or a month longer and be marketed as a baconer, in which class he will realise a price that should more than pay for his keep for this extra period. This is a point far too many farmers fail to realise; the general complaint amongst bacon-curers to-day is that farmers are rushing their pigs into market before they are heavy enough or carry sufficient condition for curing, this especially so in the Southern States, where there is a general "scare" owing to numerous outbreaks of disease among pigs, particularly in the metropolitan areas of Sydney and Melbourne.

PLATE 49.—A KELPIE-REARED POLAND-CHINA SOW.

This photograph is of a Poland-China Sow, suckled and reared by a Kelpie bitch, the property of Mr. A. J. Little, of Coolabunia, Queensland. The dam of this young sow died shortly after giving birth to her litter. The Kelpie had a litter of pups about the same time, but as they were "not wanted" they were destroyed. The bitch soon developed a heavy flow of milk and it was at this stage that the sow shown here discovered this new source of food supply. The bitch and the sow became firm friends, and as will be noted, both were doing well at the time the photograph was taken, by which time the sow was approaching marketable age as a light baconer. The photograph is certainly a unique one.

Bacon Pigs—Light, Prime (or Medium), and Heavy.

As with porkers, the demand for bacon pigs centres more upon the medium and prime weight pigs than upon the lighter or heavier, overfat grades. In fact the very light bacon pig, like the overweight porker, is not desired. He shrinks heavily in weight while in transit, and loses condition very much more as a result of handling. A pig that is too heavy for the pork butcher, yet not heavy enough for the bacon-curer, is in a class that is likely to suffer more on a falling market than any other grade, therefore breeders who desire to secure bacon pig prices should aim at placing their baconers on the market when they are five and a-half to six or even seven months old at about 120 to 125 lb. dressed weight (on approximately 170 to 179 lb. live weight). The bacon-curer prefers a pig this size, because the carcass can be retailed more profitably in the form of ham, shoulders, flitches, middles or sides. The heavy bacon pig is a better market animal than the heavy porker, because the former carries a more weighty ham, but he is not as profitable "all round" as the pig of medium weight, and should not be kept so long in the fattening yard or pen. It must always be remembered that the pig is a greedy feeder, and so long as he is feeding he is either doing so at a profit or at a loss to his owner. It pays handsomely to watch the markets carefully and to place before buyers the class of stock most in demand. The demand for bacon pigs is very keen, so much so that bacon curers have buyers or agents operating in practically every district throughout the State; the competition is so keen that the farmer need have no fear that his stock will not realise market values. Good pigs always realise good current values; whether these values are profitable to the farmer or not is, of course, another question, and one that bears a direct ratio to cost of production and handling. See table for ages, weights, and approximate values.

PLATE 50.—ANOTHER ANIMAL STUDY.

In this case "Pussy" came to the rescue, and is shown with her family of puppies. The photograph is an original one from Tolga, on the Atherton Tableland, Queensland.

Backfatters.

The term "backfatter" is used by pig buyers to indicate that the pig has passed the stage at which he can profitably be handled as a bacon pig, and that having passed that stage his carcass must be "cut up" into smaller pieces and be used in the manufacture of the variety of small goods for which the carcass of the pig is justly famous. The term "backfatter" also indicates that the pig is a very heavy one, and that he carries the greater portion of his fat on his back or on the upper portions of his body. Backfatters fluctuate in value more than any other grade of pig, and as a class they can fairly be considered as unprofitable; still the class embraces a variety of heavy pigs, old fat sows, barrows, and very heavy bacon pigs that for various reasons might not have been marketed earlier. It would not pay under ordinary circumstances to breed pigs for sale as backfatters, but it certainly pays to fatten up brood sows that have become unprofitable, either on account of age or because they are unsatisfactory as breeders; it pays to cull and fatten up any sow that fails to produce a satisfactory litter twice a year, therefore the backfatter class provides a suitable market outlet for old heavy pigs or for fat pigs over the ordinary market weights. The price varies considerably according to supply and demand and the quality and condition. During the war phenomenal prices ruled for very heavy fat pigs, as much as £22 15s. having been paid at the Abattoir Saleyards, Homebush Bay, New South Wales, for a very heavy fat sow. Prices ranging from £12 to £20 were quite common, but during normal periods these prices are not heard of, though in the markets of the South (Sydney and Melbourne particularly) from £4 to £10 are quite common figures for prime quality backfatters. In Queensland, however, and in Northern New South Wales, these cannot be obtained, hence we have stated the value of backfatters as £3 to £4, a value within the reach of the farmer if his pigs are of sufficiently good quality.

Stags.

Old sows are usually graded as backfatters, whilst old boars that have been castrated and fattened up are classed as "stags," and for them the demand is very limited. Stags are purchased for rendering down mostly, the fat goes into the manufacture of lard, the lean meat goes to the sausage tub, and most of the heavy gristly skin (the shield and wrinkly skin along the neck and sides) is cut away by the Meat Inspector and is condemned as unfit for human consumption. "Aged" stags rarely pay for the feed they consume.

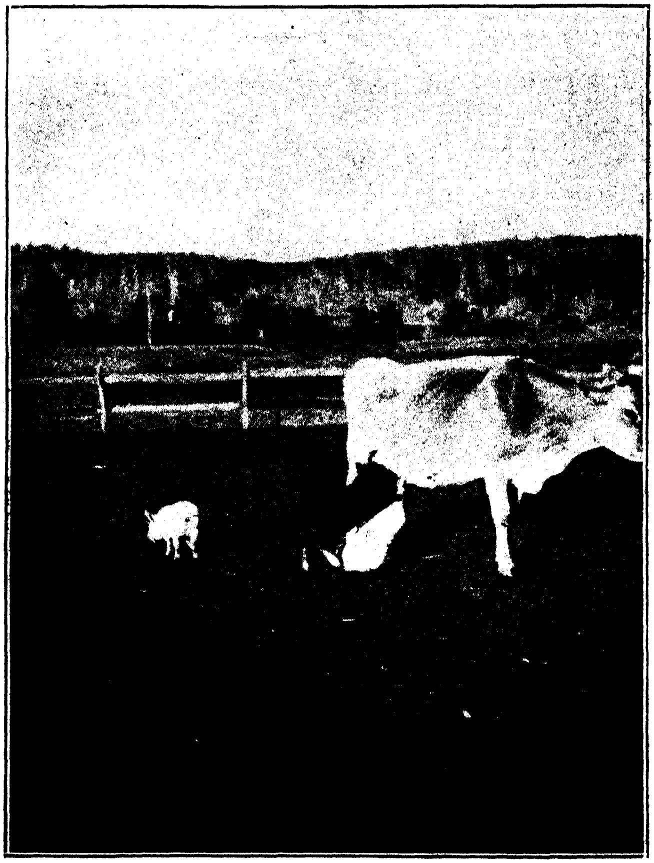


PLATE 51.—A PHOTOGRAPH FROM THE CROW'S NEST DISTRICT, QUEENSLAND.

Here again the cow seems to be quite content to nourish these weaners, while they in turn (except the little fellow) appear to be on a good wicket. Another indication of the wisdom of the pig.

Boars.

It does not pay to market boars unless one has an abundant supply of very cheap food; they rarely realise more than from £1 to £2, and they will only realise these prices if they are comparatively prime and in good condition. Whether it would pay to castrate them and fatten and market as stags is a very debatable point, and one that can only be answered by the owner. It would not pay to fatten them upon purchased foods unless the food was very cheap and the market rates of pigs reasonably high.

Bacon factory buyers nowadays will not accept boars at all, and all ''stags'' are accepted only on condition that they have been ''emasculated'' (castrated) three months beforehand.

Choppers.

Pigs that are marketed in a half-fat condition and that are unsuited to the requirements of the pork butcher, or the bacon curer, or for use as backfatters, are usually classed as ''choppers''; the term indicating that they are purchased for chopping purposes—that is, the carcass is chopped up into a variety of pieces and is used either for export as salt pork or pickled pork, or is used in the manufacture of small goods. Choppers vary in price according to their weight, condition, and quality. The class provides a very useful market outlet for a variety of pigs that could not be marketed profitably in the classes for which they might otherwise be suited.

PLATE 52.—AN UNEXPECTED SOURCE OF "PIGGY'S" FOOD SUPPLY.

An incident on the farm of Mr. J. Stinger, of Speedwell, Preston Line. It was because the cow was giving so little milk at the bucket, while still being well fed and cared for, that a watch was set and above photograph secured. It is evident the pig has a well-developed, keen sense of business. The cow appears to be content.

OTHER STOCK TERMS REFERRING TO PIGS.

Apart from the general classification of pigs for trade and market purposes, there is a breeding classification in which other terms are used to describe the pigs at different stages of growth.

Commencing at birth the young pig is variously known as a sucker, a pigling, a bonham, a piglet; or, in a group, he is part of a farrow or litter.

The Yelt.

Having passed the sucker stage the young female pig is called a ''yelt'' or ''gilt'' until she has produced her first litter. This term ''gilt'' is quite a common one among farmers from England, Scotland, Ireland, and Wales, but is not a common term in Australia.

The Brood Sow.

Having produced a litter, the yelt now becomes one of the matrons of the herd, and is henceforth known as a brood sow or as a breeder or breeding sow.

The Male Pig.

The boar usually retains his title throughout life. The male is often termed the "hog," but in America all pigs are called "hogs" (*i.e.*, the hog industry); in fact, the Americans rarely use the term "pig" at all, and when they do use it, it is to describe suckers or very young stock. The boar does not actually begin his stud duties until he is ten to twelve months old, the sow also should be at this age before being mated.

The term "pig" is now, however, being generally accepted as the correct one for males and females of the "porcine" species, the term "swine" is gradually being dropped, and the term "hog" used to designate the male pig.

The Barrow Pig.

A male pig castrated whilst young is styled a "barrow." In American literature again both boars, barrows, and sows at the age of about four or five months are styled "shoats," but here they are called "store" pigs, and the term, is a general one including all grades; a group of store pigs often includes breeding sows in poor or rough condition—in fact the group might include any class of pig in poor or half-fat condition.

PLATE 53.—DOWN ON THE FARM.

The Piglet appreciates its bottle. A Domestic Scene on the Farm of Mr. R. Wight, Market Reports' Officer, Station 4 Q.G., Brisbane.

Runts.

The "runts" of a litter are the small, weedy, or weakly pigs. They often do not pay for rearing, as they require too much special care and attention.

Rickety Pigs.

Pigs that suffer as a result of a long train or steamer or road journey and that arrive at the saleyards or factories "down" in the hindquarter, or that are unable to walk, or that walk with difficulty, are usually styled "rickety" or "groggy" pigs. The term is an erroneous one so far as its reference to the disease called "rickets" is concerned, although pigs suffering from rickets exhibit much the same symptoms.

Scrub or Mongrel Pigs—*i.e.*, The "Razorback" of American Literature.

A scrub or mongrel is an animal of mixed or unknown breeding without any definite type or markings. Other terms used to describe mongrels are "bronchos," "razorbacks," "wild pigs," "bush pigs," &c.

Purebred, Pedigreed, or Stud Pigs.

An animal that is included in this class is one of pure breeding, representing a definite, recognised breed, both of whose parents were purebred animals of the same breed. To be classed as purebred, live stock must be either registered, eligible for registration, or (in the absence of public registry for that class) have such lineage that their pure breeding can be definitely proved and recorded. To be of good type and quality, the animal must be healthy, vigorous, and a creditable specimen of its breed; its breeding must be pure.

In Australia the interests of the stud pig breeder are cared for and fostered by the Australian Stud Pig Breeders' Society, which organisation has branches in each of the States. The Queensland Branch Secretary is Mr. R. G. Watson, Inns of Court, Adelaide street, Brisbane, from whom, or from the Instructor in Pig Raising, further details *re* the operations of the society may be obtained at any time.

PLATE 54.—FEEDING THE ORPHANS.

Mrs. Percy Campbell, of Duroc-Jersey fame, attending to the orphans on the farm at Lawn Hill, Lamington, *via* Beaudesert, Q.

It is scenes like these that illustrate the keen, intelligent interest Queensland's womenfolk have in farm affairs. A little extra care and attention mean much in matters of this description.

Thoroughbred.

In speaking of pigs the term "thoroughbred" means the same as purebred. In American and English literature the term "standard bred" is also largely used. This is a term that we rarely use at all—it refers to the purebred animal.

Crossbred.

This term applies to the progeny of purebred animals of different breeds—that is, a Berkshire boar mated to a Tamworth sow produces crossbred pigs; both parents are purebred pigs but of different breeds. The crossbred pig is very popular as a "meat" pig, and is produced for market purposes in practically every district where pigs are bred. Crossbred males should be castrated; they should not be permitted in the herd as sires. The crossbred sow, on the other hand, if of good type and conformation, makes an excellent breeding sow when mated to a purebred boar.

Grade.

This term differs from that referred to above, in that it is applied to the progeny of a purebred boar mated to a crossbred sow. Sometimes the term "grade" is used where the progeny are from parents whose breeding is pure, but whose pedigrees for various reasons have not been recorded. The offspring of a purebred boar and a grade sow is also a grade, but through progressive breeding becomes a higher or better grade. When a Berkshire boar is mated to a crossbred Tamworth-Berkshire sow the progeny are called grades. A sow of the latter class mated back to a Berkshire boar frequently produces progeny to all appearances purebreds; they are sometimes called three-quarter breds, having as it were three-quarters Berkshire and one-quarter Tamworth blood in their veins.

Any further information in connection with the classification and marketing of pigs or on any other aspect of pig raising may be had on application to the Department of Agriculture and Stock, William street, Brisbane, Queensland.

HORSE *v.* TRACTOR.

In selecting between the horse and the tractor the saving in expense must be considered. In the case of the horse the costs are almost all non-cash costs. In the case of the tractor the costs to a large extent are cash expenditures. The feed used by the horse is home-grown. The fuel used by the tractor must be purchased. The horse, however, must be fed every day, while the tractor requires fuel only when it works. The horseowner can remove this obstacle by planning more work for the horse, so that the feed consumed may be made up in work. Depreciation and interest charges are constantly accruing against the tractor, even when it stands still. These charges often amount to more than the expense of feeding horses when they are idle.

Unquestionably more labour is required to take care of horses, but the labour comes during those periods of the day when no other work would be done. It is questionable whether such labour really is an expense, for there is little or no opportunity of doing anything else. The original outlay for horses or tractors varies little. The tractor depreciates, while the horse is able to appreciate for a time at least. By proper handling and breeding, horses may be made to replace themselves. Only a cash expenditure can ever replace a tractor. The horse also adds to soil fertility. The usual number of horses required for farm work cannot do the work quickly enough. In such cases, tractors may be used to supplement horse labour, and then used for other heavy work and belt work. Whether or not horses should be used in such cases depends on the farmer. Extra horses are needed, and if there is not sufficient work to keep these extra horses busy throughout the year feeding becomes expensive.

On general farms, where feed is grown and the labour largely supplied by the farmer, the horse is the efficient type of power. When the tractor displaces horses trouble in the form of increased cash costs is likely to appear. On the other hand, it is often economical for tractors to supplement horse labour. If must be remembered, however, that such work is of a supplementary character. The horse is and should be the unit of farm power. The farmer should not be concerned about whether he should use tractors or horses, but should busy himself in getting the best horses possible for his work, and then keep them busy. Too often horse labour is inefficient because of poor horses.

With the right type of horses and proper breeding combined with efficient farm organisation and use, so that horses are worked to the maximum capacity, a great deal more work can be done on farms without an increase in cost of any kind, and at the same time the costs are all practically non-cash in character.

Horses supply a steady, regular market for many farm crops, and these crops can be so utilised that the labour charges and transportation costs of marketing can be eliminated. Furthermore, horses eat little more when working than when idle. Consequently, from the farmer's viewpoint, the management problem is to keep horses working. A slogan that could well be followed by farmers at present would be—keep horses and keep them busy.

Answers to Correspondents.

The subjoined replies are from a very large number posted from the Department to correspondents in the course of the month, and are selected because of their general interest. All inquiries should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Fertilizing Practice

R.J. (Narangba)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises: Basic superphosphate can be applied at any time to crops, like superphosphate or bonemeal. Basic super. can be mixed safely with nitrate of soda and sulphate of potash, and also with bonemeal. Nauru phosphate is not suitable for top-dressing or for making liquid manure, as it is practically insoluble in water. Nauru phosphate mixed with superphosphate is recommended as a substitute for basic superphosphate which is far too expensive for general use.

Tanning Pelts.

INQUIRER (Goomeri)—

To tan with wattle-bark is the most satisfactory method. Boil the chopped up bark, mixing about 1 lb. of bark with every two or three gallons of water. Skins should be free of all flesh, grease, and blood before tanning. As the tan is taken up by the skin fresh infusions of the same strength should be made. Small skins should be left in the tan for two or three days. Kangaroo skins should be left for about a week. Another method is the following "lightning process":—Over 2 quarts of bran pour 5 or 6 quarts boiling water, then strain. Put as much salt in an equal quantity of blood-warm water as it will dissolve. Mix the bran water and salt water, and to each gallon of the mixture, when lukewarm, add 1 oz. sulphuric acid. Then immerse the skins, stirring occasionally until tanned. Rabbit skins take about twenty minutes, sheep and kangaroo skins from forty to sixty minutes. When tanned, rinse in water and hang in a shady place to dry. If the skins are dry at first, soak in water before tanning. Work the hide well when drying by pulling it around a square post. When it is quite dry work in a little neatsfoot oil.

PIG RAISING.

Selected replies from the correspondence of Mr. E. J. Shelton, H.D.A., Instructor in Pig Raising.

Pig Literature.

A.L. (Jondowae)—

Yes, you will find conditions in Australia quite different to what they are in Scotland, and you will find it takes time to become acclimatised and used to our conditions; but you will soon get over that. We forward pamphlets on pig-raising, also copy of the last issue of the Journal, a publication to which every settler should be a subscriber. It costs but 1s. per annum, which pays postage on twelve issues, so it is a gift to farmers. If you list questions on which you would like local advice we would gladly place our knowledge and experience at your disposal.

Prices and Weights.

R.A.H. (Killarney)—

Copies of the current price schedules as issued by both the proprietary bacon companies and the Queensland Co-operative Company of Murarrie have been forwarded. You will note in the case of the proprietary company's schedule that column No. 1 indicates the live weight of the animal, and the second column the estimated dressed weight, these allowing for deductions varying from 25 to 32 per cent. similar to those in operation at the Dandenong Bacon Factory. The third column indicates the actual rate per pound for prime quality pigs, whilst the fourth column represents the total value to be paid for animals of this weight. It is quite evident from your letter that the pigs were overweight. Top prices are only paid for pigs between approximately 100 and 125 lb. dressed weight. Pigs over or under these weights are not paid for at the same rate as you will note in the price schedules.

Breeds of Pigs.

A SYDNEY INQUIRER—

Question.—Which is the best breed of pig to go in for, whether purebred or crossbred, i.e., for market purposes, at any and all stages?

Answer.—This is a difficult question for an Instructor to answer, let alone a breeder of purebred stock. In one sense there is no best breed; that is why we have a multiplicity of breeds of live stock. Even races of men differ and white men find it difficult to live in some countries which nature evidently intended for the dark-skinned races. Then, again, no one breed could be classed as the best breed unless that breed suited the purposes for which they were intended. One might look upon a race horse as an excellent type of animal, yet a race horse would fare rather badly if harnessed to the plough. We take the opportunity of forwarding copies of the "breed" pamphlets in which will be found a great deal of useful information relative to various breeds and crosses.

For bacon pig production the standard cross in New South Wales and Queensland is the Berkshire-Tamworth—i.e., using the Berkshire boar on Tamworth and first cross (unrelated to the boar) Berkshire-Tamworth sows. For porkers the Middle Yorkshire boar (or a boar of similar breed) crossed on to Berkshire or similar type sows, but these crosses can only be looked upon as "guides" to what is possible in pig production if carefully and efficiently controlled. As to whether there is a better cross than, say, the Berkshire-Tamworth—well it would take a great deal of argument, possibly heated argument, to settle this point. The Victorian authorities consider that the Berkshire-Tamworth cross is a back number in comparison with the Large Yorkshire-Berkshire cross. We have not yet been able to experiment along these lines, hence can only be guided by their experiments, which as yet, of course, are only in the initial stages. We know the Large Yorkshire-Berkshire cross to be a really good one, one that the Danish and Canadian people and more recently still the New Zealanders and the Victorians have found to be both prolific, early maturing, and of even type.

Another debatable point is whether the Tamworth boar shall be crossed on to Berkshire sows or *vice versâ*. We prefer the Berkshire boar crossed on to Tamworth or grade Tamworth sows, but good results will be obtained in the opposite direction, in fact we are often forced to recommend the Tamworth boar, for it is not an easy matter to secure good class Tamworth sows; whereas in pretty well every district good class Berkshires are available. Then, again, the breeders of Tamworths contend that Tamworth boars are splendid workers and in this respect their views must be considered.

The Gloucester Old Spot breed is as yet new to Australia, and they have not yet been tested out in close competition against the other breeds and crosses. The Gloucester Old Spot pig is not an attractive pig to look at (that is, of course, if you could believe that any pig is attractive looking) hence it will take time and local experience to demonstrate their commercial value. The Gloucester Old Spot have certainly done well so far, and their crosses have on many occasions "topped the market." They need to be crossed with the medium breeds to get best results for our markets, and in this connection again Gloucester Old Spot sows appear to be ideal mothers, producing large litters and suckling them to considerable advantage. This breed also is described and illustrated in the Gloucester Old Spot pamphlet.

Copies of these breed pamphlets and pamphlets on other aspects of pig-raising are available free of charge to any breeder sufficiently interested to write for them. Applications should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane, Queensland.

BOTANY.

Selections from the outward mail of the Government Botanist, Mr. C. T. White, F.L.S., which are of general interest.

Creeping Tick Trefoil.

R.S.B. (Brisbane)—

The specimen of clover-like plant is *Desmodium triflorum*, the Creeping Tick Trefoil. Species of Desmodium are known as "Tick Trefoils" because the pods break up into little one-seeded pieces that cling to clothing, &c. The Creeping Tick Trefoil makes quite a good turf and grows in a variety of soils. Like other legumes it enriches the ground. It is more persistent than clover, and once established there is always likely to be a certain amount of it mixed with grasses that would follow.

"Castor Oil Bush *(Adriana acerifolia)*.

A.W.S. (Marlborough, Q.)—

The plant is *Adriana acerifolia*, fairly common in Central and Western Queensland. The only local name we have heard applied to it is "Castor Oil Bush," but the true castor oil is a common naturalised weed in Queensland so this local name is unfortunate. The plant is fairly abundant in parts but cannot be said to be an aggressive weed. It is freely eaten by stock and is not known to possess any harmful properties.

Nut Grass.

A.H.H. (Wollongbar, N.S.W.)—

There were no seed heads on the specimen sent, but I have no hesitation in identifying it to *Cyperus rotundus*, the common nut grass. This plant in Queensland extends some distance inland, particularly along river flats. The inland plants are often very robust in a good season. In Western Queensland it has some reputation as a sheep fodder. No analyses, so far as I know, have been made of the leaves, but, as you probably know, it is a sedge not a true grass and the nutritive value of sedges on the whole is rather low.

"Fairy Grasses"—"Love Grasses."

L.C. (Westwood, C.Q.)—The three grasses have been determined as follows:—

Sporobolus Lindleyi. This, and a few other grasses of a similar nature are known in Queensland as "Fairy Grasses." It is rather a useful grass in the mixed pasture, but is of short life, soon forming a mass of finely divided seed heads.

Eragrostis Brownii.

Eragrostis interrupta.

Species of Eragrostis are popularly known as "Love Grasses"; they are mostly of secondary importance as fodders, but are useful grasses in the mixed pastures. The grasses, with names attached, are enclosed herewith. In sending specimens it is as well to number each specimen, retain a duplicate, and names will be returned to numbers.

FRUIT CULTURE.

Following are selected replies by the Acting Director of Fruit Culture, Mr. Geo. Williams, to correspondents in the course of the month:—

Budding of Citrus Trees.

J.D. (Chowey, Gayndah Line)—

Citrus trees are successfully budded in early spring and also about April or May. It is necessary to remove the budwood from the parent tree when it is in a dormant condition. However, for spring budding, if not done earlier, buds may be removed now and placed in moist sand until required for use.

Coffee Culture.

L.B.B. (Innisfail)—

A leaflet on coffee culture has been posted. Owing to the present tariff, there is no prospect whatever of making coffee a paying proposition in any part of Queensland, consequently its planting is not recommended.

Pineapple Cultivation.

C.B. (Cooran)—

The first requirement for pineapple-growing is a well-drained soil of good depth and of at least moderate fertility. Suckers from the parent plant or gill sprouts, sometimes referred to as "buttons," which originate around the bases of the fruit, are preferable for planting. The ground should be in a state of thorough cultivation and free from perennial weeds. The most suitable season of the year is from September to January, both inclusive. Pines are usually planted in single rows on level ground about 7 feet between rows and 12 inches between plants. On hillsides, 7 feet intervals and 20 inches between the double rows and 20 to 24 inches apart for plants in the rows.

Pineapple Growing.

L.J.S. (Newdegate, W.A.)—

The Burnett and Callide Valley are not considered suitable for pineapple culture, as the pineapple requires a warm situation, free from frost. Regarding the cost of production, £50 per acre may be accepted as the minimum for clearing, preparing, and planting. The first crop would be expected in about eighteen months and the necessary cultivation in the meantime would be confined to weeding, which would be a comparatively small item provided the roots of perennial weeds were eradicated in the preliminary cultivation. The average market price of pineapples throughout the year would be about 7s. per case (1½ bushels). The amount of capital needed would depend largely on the first cost of land, if freehold. Six acres under pineapples would be the minimum to provide a satisfactory return from one man's labour.

Valencias—*Passiflora ligularis*—Nuts.

L.P.R. (Epping, N.S.W.)—

Buds of the Valencia orange sport may be obtained from Percival Bros., orchardists, Redland Bay. *Passiflora ligularis* seeds are not available as there are no plants up to the present fruiting in this State. It is expected, however, that they will be available next year. The department has no wood available of the Pecan Nut, but the Acclimatisation Society, Lawnton, near Brisbane, have a fair number of grafted trees and application to the manager at that address would receive attention. No difficulty whatsoever has been experienced in raising the thin-shelled Macadamia, but the practice has been discontinued on account of the price—1s. per nut—charged by the owners of the parent trees.

THE JOURNAL APPRECIATED.

Writing from Bunjurgen, a Fassifern farmer says (30*th June*, 1927): *I'm sending the sum of* 1*s. to renew the 'Queensland Agricultural Journal,' and I can say this Journal has been in many things of great value to me. Also, I must say we farmers can be very thankful to the Department of Agriculture for the cheap and valuable information and teaching it has given to us through its Journal, and my hope is that all farmers think as I do and appreciate the work our Government does for us. . . .''*

General Notes.

Wheat Board.

Regulation 3 under the Wheat Pool Acts has been rescinded, and a further regulation approved, providing that for the 1927-28 season representatives on the board shall be elected by growers of wheat who delivered to the board wheat harvested during any of the three previous seasons, growers of wheat to whom seed has been supplied by the board for the year in which the election is held, and other bona fide growers who may make application for a voting paper.

A Proclamation has been issued under the Wheat Pool Acts, providing for the Wheat Board to give security for financial assistance rendered by the Rural Credits Branch of the Commonwealth Bank.

Seed for Cotton Sowing.

The Acting Premier and Minister for Agriculture, Mr. W. Forgan Smith, has informed the Press that, on learning of the fire at the cotton ginnery at Glenmore, Rockhampton, he immediately arranged for the Cotton Specialist, Mr. W. G. Wells, to visit Rockhampton for the purpose of inquiring into the extent of the damage that had been occasioned by the fire upon the supply of cotton seed which was held at the ginnery. The Government was not financially interested in this cotton seed, but, of course, is concerned in the matter of the supply of ample quantities of pure cotton seed for next season's planting. The Minister has now been advised that the seed at Rockhampton had been so damaged as to render it unfit for planting purposes. However, it is intimated that the further supplies of seed cotton that will be available for ginning purposes in the future will provide ample supplies of seed to meet the requirements of the 1927-28 season.

Staff Changes and Appointments.

Mr. W. Ahern has been appointed Assistant to Cane Tester at the Inkerman Sugar Mill.

Mr. J. C. Pryde has been appointed Temporary Inspector of Stock, as from 1st July, 1927, to 12th August, 1927.

The resignation of Mr. A. B. Smyrell as Temporary Inspector of Stock, Coolangatta, has been accepted as from 30th June, 1927, as tendered.

Mr. E. M. Johnson, Temporary Inspector, Agricultural Bank, has been appointed Inspector, Agricultural Bank, as from 3rd July, 1927.

Mr. A. P. Deshon, Assistant Manager, Agricultural Bank, has been appointed Manager, Agricultural Bank.

The appointments of the following gentlemen as Inspectors under the Diseases in Plants Acts have been cancelled as from 16th July:—R. S. Molloy, Nambour; C. E. Rogers, Mooloolah; F. H. Scott, Landsborough; J. H. Warnek, Nambour; F. D. Young, Palmwoods; S. R. Donnelly, Glass House Mountains; and A. B. Tanner, Nambour.

The following have been appointed officers under and for the purposes of the Animals and Birds Acts:—J. Cowap, Bald Hills; G. W. Carseldine, Bald Hills; and J. A. Coleman, Tambourine Mountain.

It has been approved that Messrs. F. A. L. Jardine, S. C. Todd, and H. St. J. Pratt, Inspectors under the Diseases in Plants Acts, be attached to Nambour, Wallangarra, and Stanthorpe respectively.

Mr. R. J. T. Kidd, Inspector of Stock, Mackay, has been appointed also Inspector of Dairies.

Mr. F. C. P. Bell, Assistant under the Pure Seeds Acts, has been appointed Inspector under the Fertilisers Act, Pure Seeds Acts, and Stock Foods Act, as from the 1st July, 1927.

The following appointments have been rescinded:—Miss E. Brand, Assistant Cane Tester, Bingera Sugar Mill; Miss S. Riley, Assistant Cane Tester, Tully Sugar Mill; and Mr. E. J. Barke, Cane Tester, Marian Central Sugar Mill. Miss S. Riley has been appointed Cane Tester at the North Eton Central Mill, and the following have been appointed Assistants to Cane Testers at the mills respectively set opposite them:—Miss M. A. Lyle, Bingera; Miss M. Bennett, Farleigh; Miss O. Knight, Millaquin; Miss M. Morris, Moreton; Miss J. Orr, Tully; and Miss M. Orr, Pleystowe.

Fruit Marketing—Sectional Group Committees.

The regulations passed last year in connection with the various Sectional Group Committees have been amended to provide for the elections of members for the forthcoming year for all such committees, with the exception of the Citrus Sectional Group Committee, which will not hold an election this year.

Butter Board Election.

The following nominations have been received in connection with the election of a Growers' Representative to the Butter Board, Division No. 1a (North Queensland):—

Wilfred Alexander Johnston, Ravenshoe,
James Reed, Malanda,
Walter Scott, Peeramon,
William James Sloan, Malanda.

The date of the election has been fixed for the 4th August, 1927.

The Folly of Marketing Immature Fruit.

The Minister for Agriculture informed the Press recently that the maturity standards prescribed for local fruits are not always being observed. As a result, the effects of immature custard apples being rushed on to Southern and Brisbane markets has been a material falling off in the demand for this esteemed fruit. If allowed to remain on the tree until the interstices between the corrugations, which are so pronounced on the large types, show indications of changing to cream colour the fruit will satisfactorily ripen; but where picked at an earlier stage the fruit becomes brown and hard and, even if it softens, is of inferior flavour and gritty. The demand for other more widely known fruits (pineapples, &c.) is also affected by the sale of immature lines submitted by a limited number of growers, and if the practice is still persisted in, action will be taken by departmental inspectors.

Protecting the Banana Industry.

The Acting Premier and Secretary for Agriculture and Stock, Mr. W. Forgan Smith, in connection with banana planting operations for the coming season, has called attention to the restrictions that apply to the removal of suckers. These conditions which have been in force since last season are that an inspector may, if he is satisfied upon inspection of a nursery, orchard, or other place, that it is and always has been free from the disease known as Bunchy Top or any other proclaimed disease, issue a permit for the removal of plants from that place to any other place or part of Queensland mentioned in such permit. This is regarded as imperative to minimise the possibility of disease being introduced into clean areas or further distributed in localities where previously established. Permits for the removal of suckers will be issued where circumstances warrant, by inspectors in their various districts.

Proposed Queensland Maize Board.

Nominations for the election of six Growers' Representatives to the proposed Queensland Maize Board closed at the Department of Agriculture and Stock on the 27th June, when the following were received:—

District No. 1—
  Chas. Bateman, Woodford;
  Thomas Greer, Plainland;
  Thomas Lewry Moon, Blenheim; and
  Alfred Chas. Wagner, Boonah.

District No. 2—
  Thomas Braithwaite, Tannymorel;
  George Burton, Cambooya;
  William Dearling, Oakey; and
  Frederick Thomas Keable, Tannymorel.

District No. 3—
  Hubert Tetley Horne, Coolabunia;
  Joseph Henrikus Koets, Alma Creek; and
  Charles George Young, Wowan.

The date of election has been fixed for the 5th August, 1927.

Castration of Pigs.

A well illustrated pamphlet by Mr. E. J. Shelton, H.D.A., Instructor in Pig Raising, on this simple surgical operation, containing detailed instructions written in everyday language, is now available free of charge on application to the Under Secretary, Department of Agriculture and Stock, Brisbane. As the demand is heavy and the edition limited early application is advised.

Radio Lectures for Farmers—Policy in Denmark.

Radio is proving of distinct economic value to the farmers of Denmark, according to a recent official report, which states that during the past few years the Danish agricultural industry has been aided, especially in its harvest work, by the radio service of the Meteorological Bureau. That this service has been of value to the farmer is now brought out by the fact that important Danish farm organisations have decided to work for its extension. To this end a committee has been appointed, which will co-operate with the Government Radio Control Bureau. This bureau has met the request of the farm organisation with sympathy, and at the present time plans are under way for the broadcasting of special programmes for the Danish farmer; at least two lectures dealing with agricultural problems will be broadcast each month, and from time to time agricultural experts will deal with seasonal agricultural matters in the same manner.

In this connection it is interesting to note that Station 4QG has been catering for the farmers of Queensland since its inception. A specially trained market officer (Mr. Robert Wight) is employed at the station, and personally conducts farmers' sessions daily.

A Business Proposition for the Future.

All over Queensland there are families whose happiness is the result of foresight of men, who, while still living, have made wise provision for the future. There are over 15,000 of these men who have made wise provision for the future of their families by making wills appointing the Public Curator their executor and trustee, for the simple reason that his office is permanent and is under the guarantee of the State of Queensland.

One of these men, who is typical of many others, looked into the face of his loved ones and thought—"They are happy now; but how can I ensure their happiness in the years to come?"

He made a will. For his wife, inexperienced in business matters, he placed a trust fund to protect her against the tragedy of ill-advised investments. For his children's education, he set aside a special fund. For his boys, he provided that their whole share of the estate should be paid to them at a matured age. For his daughters, he willed that their shares should be kept in trust during their lives, so that, married or single, they would be financially independent.

Then came the question. Who was to carry out these trusts? He decided that it would be unfair to his wife to ask her to manage property, which it had taken his utmost labour and efforts to accumulate; nor did he think it a fair thing to appoint any of his friends, no matter how trustworthy they might be, executors under his will, for they might die at any time, and throw the administration of his estate into hopeless confusion.

This prudent man, therefore, appointed the Public Curator of Queensland his executor and trustee because he has attributes and powers which no private person possesses, such as special legislative powers, continuous existence, accumulated experience, financial responsibility, perfected machinery of administration, and an experienced legal staff to carry out all the legal work of administration without extra cost to the estate.

Now, long after this prudent man's death, the Public Curator is still serving his family from year to year, his officers acting with understanding of each individual's needs, while observing a strict impartiality. Moreover, the money held in trust for his infants is accumulating at 5 per cent. per annum, and when the time comes for them to receive their shares the money will be immediately available.

As this man made provision, so any man can provide, in proportion to his desires and means, for his family's future.

Pamphlets giving full information concerning the Public Curator Office may be had on application, either to the Public Curator in Brisbane, to his Local Deputy at Rockhampton, Townsville, and Cairns, or to any Clerk of Petty Sessions in the State.

South Burnett Cleansing Area.

An Order in Council has been approved under the Diseases in Stock Act slightly extending the south-eastern boundaries of the South Burnett Cleansing Area.

Cheese Board.

The operations of the Cheese Board have, by Order in Council, been extended for a further period of three years—viz., from 1st August, 1927, to 31st July, 1930.

Swine Fever.

Under the Diseases in Stock Act an Order in Council was recently issued prohibiting the introduction into Queensland of swine from New South Wales and Victoria. This Order has now been rescinded and a further Order issued prohibiting the introduction into Queensland from other States of the Commonwealth of swine, with the exception that pigs for immediate slaughter, which, in the opinion of an inspector, are healthy, may be admitted with the approval of the Minister for Agriculture under such conditions as may be imposed by him. This prohibition is the result of swine fever being present in the other States of the Commonwealth.

Skin Dealers must be Registered.

In connection with the forthcoming open season for opossums and native bears the Department of Agriculture and Stock advises, for the information of buyers at auction sales of opossum and bear skins, that all dealers in these skins must be registered. A dealer is defined as a person engaged or about to engage in the business of dealing in these skins whether by purchase, sale, or auction, and whether on his own behalf or on behalf of any other person. All buyers must therefore be registered as dealers or retail dealers as the case may be. If a buyer is acting on behalf of his own firm, either as a member of the firm or as an employee, the registration of the firm would be sufficient, but if the firm is not registered it will be necessary for its representative to register as a dealer and pay the required fee of £10.

The Royal Society of Queensland.

The ordinary Monthly Meeting of the Society was held in the Geology Lecture Theatre on Monday, 27th June. The Vice-President, Dr. J. V. Duhig, was in the chair, and fifty members and visitors present.

Mr. J. R. A. McMillan, M.Sc., was unanimously elected as an ordinary member.

Dr. Duhig announced that His Excellency the Governor, Sir John Goodwin, had consented to become Patron of the Society.

The evening was devoted to the celebration of the Newton Bi-centenary, and the following addresses were given:—

''The Life of Newton,'' by Mr. Heber A. Longman, F.L.S.;

''Newton as a Mathematician,'' by Professor H. J. Priestley, M.A.;

''Newton as a Physicist,'' by Professor T. Parnell, M.A.

A hearty vote of thanks to the lecturers, moved by Professor Hawken, seconded by Professor Scott Fletcher, and supported by Dr. Duhig, was carried by acclamation.

"Australia's Fascinating History."

Speaking on 22nd June at a meeting of the Royal Geographical Society of Queensland, which unanimously elected him president in succession to His Grace Archbishop Duhig who retired in his favour, His Excellency the Governor (Sir John Goodwin) said that he did not think any country, with regard to physical geography, could have a more fascinating past history than Australia. Years ago it was a country with an immense rainfall—probably the largest in the world—and the whole of its interior was covered with morasses and dense jungle growth, and tenanted by enormous animal marsupials. In thanking the society for the honour conferred upon him, His Excellency added that he felt very diffident about occupying the chair. He felt that he was a usurper, and that he was following in the footsteps of a man, Sir Matthew Nathan, who had set a standard and an ideal that would be very difficult to live up to. People sometimes asked what was the use of inquiring into such questions as the Barrier Reef, and the ancient fauna of Queensland? He would answer that by saying that knowledge was never useless, and in acquiring knowledge as to the past they might, and frequently did, acquire immense knowledge as to the present and future.

Atherton Tableland Maize Board.

An Order in Council has been approved under the Primary Producers' Organisation and Marketing Act, providing that members of the Atherton Tableland Maize Board appointed after the 31st August, 1927, shall hold office until the 31st March, 1929.

The Supercilious Critic.

Australians and New Zealanders are both proud and jealous of their splendid dowry, and the newcomer who begins to criticise too freely and to draw invidious distinctions between the old land and the new is liable to get himself disliked. If the British immigrant comes to condemn our inferiority, and to laud the superiority of the land he was glad to leave, in the hope of finding better things, he had far better have stayed at home. If he comes with courage and good humour to help in the progress of a young country, he will early find the road to prosperity and to the hearts of the native-born.—Auckland ''Sun'' (N.Z.).

False Economy.

Undue economy in education is a curious method of making good the unfortunate wastage of war. No one in his senses would advocate unnecessary or prodigal expenditure, but when the inevitable reply to all requests for improvements is the stereotyped ''question of finance,'' there is need to decide whether education is not of greater importance than some of the objects on which money is being expended by the State. Any refusal to meet the just demands of education, and which ignores the effect on the future well-being of the nation, will bring disastrous results, for from a purely economic standpoint the most important part of the capital of a country consists of human beings. Expenditure on their moral, physical, and intellectual advancement is the most remunerative of all investments.—''Lyttelton Times'' (N.Z.).

A Hen's Best Age.

A hen is in her prime during her first two seasons, after which time, generally speaking, she does not pay for the food she consumes. This refers, of course, to commercial stock, whose eggs are disposed of for edible purposes. There are many highly-bred exhibition birds that it would pay to retain in the flock were they only to produce a dozen eggs in the course of the twelve months. Birds of this description, however, are not included, as they belong to a class quite distinct from ordinary utility stock. Upon many farms dissatisfaction is felt at the scarcity of the egg supply, due to the fact that old birds are being depended upon that are quite past their prime, and that should be disposed of years earlier. Not only do very old hens produce far fewer eggs than those in their first or second season, but the chickens hatched therefrom lack vigour and stamina, and are generally difficult to rear successfully.

Magneto Hints.

Some owner-drivers, under the belief that it is almost impossible to remove a magneto without being capable of putting it back again in its proper place, never bother to look at the relative positions of the high-tension distributor brush and the segments. They will remove the holding-down band, take the magneto right off, and in the course of adjustment will rotate the armature; consequently, when replacing it, the connections will possibly be as much as a complete revolution out of timing.

It may be true that the modern magneto is practically impossible to replace incorrectly, owing to the couplings being so made that a wrong assembling would be impossible; but, in the majority of instances, this is not true. Therefore, when the magneto is being taken off, a glimpse should be taken at the couplings, and a few pencil marks made, so that the positions of the distributor brush and the high-tension segments will not be confused.

While the machine is apart from the engine, it would be as well to refrain from rotating the high-tension segments.

In the process of refitting, the armature-shaft should be turned until the distributor is in exactly the same position as it was when the coupling was dismantled. Having done this, no apprehension need be felt as to whether the magneto will work or not.

Always Find the Cause.

When anything goes wrong about the poultry yard find the cause. If the eggs are infertile and do not hatch, if the chicks die off, if the hens get sick or do not lay, in fact if anything happens that is not as it should be, stop and find the cause. How many times you hear people talking about luck. They have no luck raising early chickens. They never have any luck getting winter eggs or getting the pullets to lay before cold weather sets in. To hear them talk one would conclude that the poultry business was run on luck, but this is not true. Everything in the world follows cause and effect. A certain effect is produced by a certain cause, and this is just as true in the poultry business as in any other business, and should be controlled by man in all practical affairs.

Testing Tyre Pressure—A Good Motor Habit.

Major H. O. D. Segrave, 12 Princes street, Hanover Square, London, W1, writes, under date 20th May, 1927: I have had quite a busy time in public lately justifying motor racing on the familiar ground that it provides the engineer with much useful technical data. But if I may say a word more in defence of the profession which I am about to abandon, it is that the ordinary everyday motorist might pick up many ideas for his own comfort and convenience from some of the precautionary measures which at higher speeds are matters of serious importance.

One such idea is suggested by the adoption by about 95 per cent. of motor-car manufacturers of the balloon tyre, and, incidentally, the state of the roads as maintained by the few ha'pence that Mr. Churchill has left in the Road Fund. It is that motorists should acquire the habit of testing the pressure of their tyres once a week, and seeing that all four are kept up to the specified pressure.

Before I started on my run along Daytona Beach, I had my Dunlops tested with a gauge, because it was absolutely imperative that each should register 100 lb. pressure. If low or unequal pressure, with its adverse effect on balance and steering, is dangerous at racing speeds, it must be at any rate inadvisable at touring speeds.

The bumps caused by too high a pressure are a deterrent to errors in that direction, but there is no such insistent reminder when tyres are too soft or unequal in pressure. Hence the advisability of trusting to the gauge and not guesswork. At touring speed it may not be a matter of saving your life, but it does save your tyres' life.

How to Keep People on the Land.

At a recent Agricultural Bureau Conference in South Australia a paper was read by a farmer, Mr. R. H. Burns, of Arthurton, on this subject. He said one of the most serious questions confronting Australia was the settling of men on the land. A bold policy of land settlement was needed in order to populate the great spaces of Australia. A serious aspect of the subject of the paper was the fact that the younger people, those who in many cases had been trained to farm life, were drifting to the city, because of its many and varied attractions. An attractive home life should prove one of the best remedies for the trend of the people to the town. The home should be made as comfortable as possible, and labour-saving devices introduced. If farmers were to spend more money in improving their homesteads it would lessen dissatisfaction, and they themselves would enjoy some of the comforts that they richly deserved. Recreation should not be overlooked, and children should be encouraged to take an interest in farm work. A musical instrument, with one or more members of the family able to play, would have an important part in the social side of farm life.

Speaking generally, the hired man on the farm had not had in the past a fair deal. He had not received wages equivalent to that of his city brother, he had to work long hours, and his living-room had been anything but comfortable in many instances. Again, no continuity of work was guaranteed, and he soon drifted to the city for constant employment. Where a farmer had to employ labour, the speaker recommended the engagement of a married man, who should be given an interest in the farm and the opportunity of making a little extra with cows and fowls. With comfortable houses, motor-cars, wireless, &c., and the assistance of a sympathetic Government, there was no reason why the people on the land should not be contented. Those men and women who had gone out into the mallee districts and also in the settled areas should be provided, wherever possible, with sufficient water, good roads, and be given every inducement to remain on their holdings to make good.

The "Mystery" of Farming.

"The idea that farming is a mystery, which can only be appreciated by a man with a lifelong apprenticeship to the soil plus a certain measure of sentimentalism about the beauties of nature and a few doggerel rhymes about sunsets and sunrises as methods of forecasting the weather, is just plain bunkum. Experience counts very much, of course, in farming, provided it is based on real observations worked upon by real intelligence. But intelligence and scientific study can make up in a few months for the lack of many years of experience in farming, just as in every other calling. Speaking broadly, therefore, a townsman of the character that wants to farm, and with a fairly good education, will make a better farmer than an agricultural labourer with a poor education and with consequent undeveloped faculties. And no townsman need fear to tackle farming if he is prepared to seriously undertake to learn the subject as he would any other."—Dr. Haden Guest, in "Canada as a Career."

The Drift to the "Big Smoke."

Given the hope of a reasonable return for work, a training sufficient to show that mental alertness is as profitable upon a farm as in any other profession, surroundings that give a little more than animal comfort, above all, the sense of independence, which is, perhaps, the most attractive feature of successful farming, the drift to the towns should soon cease to give rise to anxiety. In any case, however, the play of the natural economic laws will correct this present tendency. But a few years ago employers of labour in towns could not secure sufficient or suitable labour; to-day the reverse is the position. But men must find work and boys must start earning, and if there are no openings in the towns they will be forced to find work in the country. And no one will deny that there is ample scope for the employment of labour in a country like ours, the natural resources of which are so great, but which at present are only partially developed.—The "Taranaki News," (N.Z.).

Care of the Cow in Calf.

It is often the simplest tasks on the farm that get least attention. Take, for instance, the work of drying-off the cow prior to calving. Not every dairy farmer recognises the importance of seeing that the work is carried out thoroughly, mainly because it is not always possible to directly associate later trouble with faulty drying-off.

For the general health of the cow she must be given a rest from milking for six to ten weeks, or perhaps longer, before calving. Not only does the cow gain needed strength to assist her in calving, but the calf she is carrying benefits by the additional nourishment made available to it during that time.

It is not always an easy matter to dry-off the cow, particularly in the case of some very heavy milkers. What should be aimed at is a gradual stoppage of the secretion of the milk, and some have the idea that the simplest way to stop the milk flow is to cease to milk altogether. The trouble is that such a procedure does not immediately stop the secretion of the milk, and that which is secreted is left in the udder to cause such troubles as "pea in the teat."

The safest way to dry the cow off is to begin by milking once per day instead of the usual two milkings, or where a cow has only been milked once a day she could be given one milking every two days. Lessen the number of milkings, and nature takes it to mean that less is required, and she responds by making less available. Although the cow is milked less regularly, it is most essential that the udder be stripped thoroughly at every milking, in order to prevent such troubles as those mentioned above.

Under this treatment the flow of milk will soon lessen, and as it does the number of milkings should be still further reduced until finally the flow ceases altogether.

The choice of suitable food during the process of drying-off can be of some help in lessening the milk flow. Dry foodstuffs, such as hay and straw, will be found to produce less milk. At any rate, foods calculated to make or force the production of milk should not be given in quantities.

After turning the cow out as dry, it is a wise plan to bring her in again in seven days' time to make sure that she has been thoroughly dried off, for the least drop of milk secreted and left in the udder to decompose will be likely to cause trouble later on.

A dose of Epsom salts (1 lb.), to which has been added 1 oz. of ground ginger, will be found a useful purgative for cows that are being dried off.

Sunlight and Sanitation.

Moisture is required for the rapid propagation of bacteria, and floors that are left wet during the day naturally harbour millions of bacteria. Open up the shed to the sunlight, and many of these bacteria are thereby killed.

Some bacteria are more persistent to sunlight than others. Typhoid germs, for instance, are killed by being exposed to the sun for six hours. Other germs are killed in a much shorter period, but the tubercle bacillus, being protected by an oily covering, requires a longer exposure to kill it.

Peanut Board Election.

Nominations for the election of four Growers' Representatives to the Peanut Board closed at the Department of Agriculture and Stock recently, with the following result:—

District No. 1 (Wienholt and Nanango).—
  Charles Frederick Adermann, Wooroolin;
  John Coe, Memerambi;
  John Wesley Johnston, Wooroolin; and
  Malcolm Redman, Crawford.
District No. 2 (Central District)—
  Alfred Skinner Clark, Sandhills (unopposed).
District No. 3 (Rest of Queensland)—
  Richard Major Wise, Buderim (unopposed).

Two representatives will be required for the No. 1 District, and the successful candidates will hold office for a term of one year as from the 1st September, 1927.

The election will take place on the 30th August, 1927.

Atherton Tableland Maize Board Election.

The following nominations have been received for the appointment of five members to the Atherton Tableland Maize Board:—

Harold Henry Collins, Atherton;
Lyall Reginald Crouch, Atherton;
George Charles Finch, Atherton;
John Gargan, Atherton;
Harold Walker Hallett, Peeramon;
Vincent Patrick Higgins, Kairi;
George Douglas Howe, Tolga;
James Paul McCarthy, Tolga;
James Joseph McDonald, Tolga;
Neil Neilson, Kairi; and
Mark Sims, Atherton.

The present members' term of office will expire on the 31st August, and the new Board members will hold office until the 31st March, 1929, in order that subsequent members will take office before the commencement of each year's harvest.

The election has been fixed for the 30th August, 1927.

New Citrus Varieties.

Among the numerous seedling citrus trees raised in Queensland are several of outstanding merit and much superior to the majority of imported varieties. The Glen Retreat mandarin raised by Mr. W. H. Parker is universally admitted as the best of its class and is now of world-wide distribution. Amongst round oranges, Byfield Seedless (originating at Byfield, C.Q.) is worthy of much more attention than it has received. A novel and most commendable feature is the entire absence of seeds. The tree is of very robust growth and a good cropper; the fruit is fairly large, of good appearance, and excellent quality. In the same locality another seedless variety was brought under notice by Mr. Mortensen, which he had named Capricornian. The sample indicated St. Michael type, with numerous fruit closely set on the branches. More recently Richards' special mandarin has invited attention, grown by Mr. N. C. Richards, a most successful orchardist of Howard. The fruit is of very fine quality, in appearance and texture somewhat resembling the Emperor variety, and of large size, average weight exceeding 8 oz. The tree is vigorous, carrying numerous thorns and fairly resistant to disease.—GEO. WILLIAMS, Acting Director of Fruit Culture.

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of subsurface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

Kitchen Garden.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of this, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft.

apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Orchard Notes for September.

THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure, such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

When necessary, manure—using a complete fertilizer rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 1 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared—viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertilizer in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed with Bordeaux mixture from then till the time the fruit is ready to colour, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Woolly aphis should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

					MOONRISE.	
1927.	AUGUST.		SEPT.		Aug.	SEPT.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.36	5.20	6.8	5.36	a.m. 8.53	a.m. 8 56
2	6.35	5.21	6.7	5.36	9.25	9.26
3	6.34	5.22	6 6	5.37	9 54	10.0
4	6.34	5.22	6.5	5.37	10.24	10.38
5	6.33	5.23	6.4	5.38	10.56	11.20
6	6.33	5.23	6.2	5.38	11.28	p.m. 12.9
7	6.32	5 23	6.1	5.39	p.m. 12.4	1.4
8	6.31	5.24	6.0	5.40	12.43	2.4
9	6.31	5.24	5.59	5.40	1.30	3.7
10	6.30	5.24	5.58	5.41	2.22	3.15
11	6.29	5.25	5.57	5.41	3.21	5.22
12	6.28	5.26	5 56	5.42	4.23	6.29
13	6.27	5.27	5 54	5.43	5.30	7.36
14	6.26	5.28	5 53	5.43	6.37	8 42
15	6.25	5.29	5.52	5.44	7.43	9.49
16	6.25	5.29	5.51	5.44	8.48	10.55
17	6.24	5·30	5 50	5.45	9.52	12.0
18	6.23	5.30	5.48	5.45	10.56	...
19	6.22	5.31	5.47	5.46	12 0	a.m. 1.1
20	6.21	5.31	5.46	5.46	...	1.58
21	6.21	5.31	5.45	5.46	a.m. 1.4	2.50
22	6.20	5.32	5.44	5.47	2.6	3.36
23	6.20	5.32	5.43	5.47	3.5	4.17
24	6.19	5.32	5.42	5.47	4.1	4.53
25	6.18	5.32	5.41	5.47	4.52	5.25
26	6.16	5.33	5.40	5.48	5.37	5.57
27	6.14	5.33	5.38	5.48	6.16	6.27
28	6.13	5·34	5.37	5.48	6.52	6.56
29	6.11	5.34	5.36	5.49	7.24	7.27
30	6.10	5.35	5 35	5.49	7.58	8.0
31	6.9	5.35			8.25	

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 Aug.	☾	First Quarter	4 5 a.m.
13 ,,	○	Full Moon	2 37 p.m.
20 ,,	☽	Last Quarter	5 54 a.m.
27 ,,	●	New Moon	4 45 p.m.

Apogee 4th August, at 4 18 a.m.
Perigee 16th August, at 1 42 a.m.
Apogee 31st August, at 9 12 p.m.

Mercury will be at its greatest brilliancy on 5th August. On the 6th Saturn will be stationary and in the head of the scorpion. The apparent nearness of Saturn and Beta Scorpii to the Moon on the 7th will be interesting to observe as soon as twilight permits these three bright objects to become clearly discernable high up in the north. About 5 o'clock in the afternoon Saturn will have disappeared behind the Moon in China, but not in Australia, and three hours later Beta Scorpii will also be occulted. On the same evening, about 10 o'clock, the occultation of Upsilon Scorpii will be observable at and near Cairns, but not in any lower parts of Queensland.

On the evening of 7th August any keen observer of the stars who has a three or four-inch telescope will find it, perhaps, sufficiently interesting to spend the greater part of the night in observing the apparent passage of the moon amongst the stars of Scorpio and Orphinucus. Such a proceeding is more to be recommended in the far north than in the south of Queensland, where the coldness of the air is likely to act as a deterrent.

About 10 minutes after 1 a.m. on the 17th the small star Upsilon Piscium will be occulted by the Moon, but at any place south of Warwick the star will be seen (with binoculars or telescope) only to skirt the edge of the moon.

4 Sept.	☾	First Quarter	8 44 p.m.
12 ,,	○	Full Moon	10 53 a.m.
18 ,,	☽	Last Quarter	1 29 p.m.
26 ,,	●	New Moon	8 10 a.m.

Perigee 13th September, at 3 42 a.m.
Apogee 28th September, at 9 6 a.m.

At the beginning of this month the Southern Cross will be prone, lying on its right side 30 degrees west of the South Celestial Pole, at about 8 p.m. Mercury will be in superior conjunction with the Sun on the 2nd, that is, on the far side of its orbit, almost behind the Sun. Towards the end of the month it will be well above the horizon after sunset, but not well situated for observation.

On the 4th there will be an occultation of Saturn by the Moon at 2.27 a.m., or nearly three hours after they have set.

On the 10th Venus will be in inferior conjunction with the Sun on the side of its orbit nearest to the earth and only about 25 million miles from it. It will be lost in the rays of the Sun, with its bright side away from the earth, but not in a direct line with it, being about 8 degrees southward.

On the 11th Psi Aquarii will be occulted at Warwick, between about 6.48 p.m. and 7.28 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

16 OCT 1927

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. 1 SEPTEMBER, 1927. PART 3.

Event and Comment.

The Governor's Speech.

ONE of the most important events of the month was the opening of Parliament on 24th August by his Excellency the Governor, Sir John Goodwin. There was much to interest agriculturists in his Speech, in the course of which reference was made to many of their industrial activities.

"The dairying industry," said the Governor, "continues to advance on the technical side, and this is evidenced by the considerable capital that is being devoted to the renovation or rebuilding of factories, with the consequent improvement of plant. The successes obtained by Queensland manufacturers in competition with other States and countries during the past few years have placed Queensland definitely in the forefront with the leading butter-manufacturing countries, while Queensland still continues to maintain its position as the premier cheese-producing State of the Commonwealth.

"The sugar manufactured from last season's crop amounted to 376,000 tons, the previous crop being 467,000 tons. As a result of this reduction in the output, a higher percentage of the sugar was consumed in Australia, and this fact, together with the enhanced price obtained for the exported surplus, enabled an average price of £24 10s. 10d. per ton to be paid to the producer. As a continuance of the policy of safeguarding the interests of the producers of sugar, the crop for the current season has been acquired under the provisions of the Sugar Acquisition Act of 1915. It is anticipated that the yield of sugar in Queensland for the present season will be about 430,000 tons. In 1920 the area cultivated for cane was 162,619 acres, while to-day it is nearly 300,000 acres, and the number of growers of cane since 1920 has increased by 70 per cent.

''Considerable attention has lately been given to the utilisation of the by-products of the sugar industry, and, with the assistance of the Queensland Government, a power alcohol distillery has been established at Plane Creek, near Mackay, where molasses is now being turned into power spirit, and this factory will doubtless be followed by others.

''The manufacture of celotex from megasse, another by-product of the sugar industry, promises to develop into a most important industry in Queensland. It is estimated that the amount of dry megasse produced yearly by the Queensland sugar mills is nearly 500,000 tons, which would make an enormous quantity of celotex board. The board is lighter than timber, and it is especially suitable for tropical buildings. Thus megasse, hitherto burnt for fuel in the sugar mills, can become a highly valuable product of enormous benefit to the sugar industry.

''In practically every district,'' continued His Excellency, ''from the Southern coastal border to the Far North, good crops of maize were obtained, and the aggregate yield is estimated to reach 4,000,000 bushels of good quality grain.

''For the first time in the history of the cotton industry, the whole of the crop this year will be consumed within the Commonwealth. This condition is likely to continue and should result in the industry being placed on a profitable basis for the grower.

''The scourge of Bunchy Top in banana plants is still a subject of concern, but it is anticipated that the close application of the conditions imposed on infested areas, which are being carefully watched by departmental officers, will effect complete control of the disease.

''The policy of my advisers in encouraging and assisting primary producers to organise continues to meet with success.

''At the present time eleven-twelfths of the value of the agricultural products of Queensland are marketed through a co-operative system under the control of the producers themselves. It has been estimated that during the financial year that has just closed the value to the agriculturists of Queensland in the increased returns as a result of co-operatively controlled marketing exceeded £1,000,000 sterling.''

Other matters to which reference was made in the Speech included the Faculty of Agriculture, Settlement of the Mount Abundance, Upper Burnett, and Callide Valley lands, developmental roads in rural districts, the establishment of a butter factory at Silkwood, the Dawson Valley irrigation project, and the vigorous methods employed in pest eradication.

Among new measures forecast are—A Rural Fires Bill, a Land Acts Amendment Bill, Agricultural Townships Bill, a Wheat Pool Acts Amendment Bill, and a Fruit Cases Bill.

Fostering Queensland Industries.

IN the course of a notable speech at the official opening of the Brisbane Show the Deputy Premier, Mr. Forgan Smith, emphasised that it was the duty and privilege of every Government to help to foster industry in every manner possible, but the impetus to make industrial operations a success must inevitably come from those who were engaged in those industrial pursuits. He paid a tribute to the unselfish work being performed by the Royal National Association, which, from the point of view of service to the community, was performing a great work for Queensland. They often heard the remark, "That is near enough"; but nothing but the best was good enough for Queensland. To maintain the high standard of living that had been set in Australia in those industries which were the subject of international competition it was necessary that they should have the highest standard of efficiency and production. From this point of view wonderful things had been achieved in Queensland. In the sugar industry, for instance, Queensland made a ton of sugar out of less cane than any other country in the world. This was due to improvement on the farming and milling side. In 1914 the amount of cane to a ton of sugar was 9.20 tons, but the average now was 7½ tons. In conclusion, the Deputy Premier emphasised that the parliamentary standards should be high, and that its authority should be maintained. "Let us, as individuals," he concluded, "while demanding a high standard in Queensland and Australia, see to it that we, as citizens, each in his allotted sphere of activity, work to make Queensland what it should be."

"Undefeatable"—The Queensland Spirit.

IN the course of a short Press interview in the ring at the recent Brisbane Show, the Governor, Sir John Goodwin, said that he was delighted with the wonderful horsemanship and jumping demonstrated in the Queensland Champion District Hunters' competition. "I wish," he added, "I could have that field in some of the hunting districts in England. It was a wonderful demonstration."

Discussing the Show results generally, the Governor said he was immensely pleased with the variety and extent of the exhibits. He and Lady Goodwin had spent several very pleasant days inspecting the several sections of the Show, and he hoped that next year he would be able to forego the whole of his public engagements so that he might devote his entire attention to the exhibition. "There is one thing," said his Excellency, "that impressed me very deeply, and that is that the people of Queensland, in spite of the uncertainty of the seasons, are undefeatable. Such a spirit and such co-operation must overcome all difficulties and promote solid national prosperity."

The Queensland Tropics—"Like being in Fairyland."

EVERY year an increasing number of southerners come north seeking the sun, and the impressions of their visit are invariably appreciative. This is what a notable visitor, Reverend Dr. R. Scott West, Moderator-General of the Presbyterian Church in Australia, said at Toowoomba recently: He had been impressed with the unbounded hospitality of Queenslanders. It had been a real joy travelling up and down Queensland. Travelling in North Queensland was like being in fairyland. He believed that the scenery there was equal to anything in the world, and he had travelled a great deal and knew a good many countries.

Queenslanders had shown, he thought, a lack of enterprise in not advertising this wonderful country. He had also been impressed with the physique of the people and the beauty of the little children, and he had no doubt as the years went by that they would develop a virile race.

He had been delighted with the people of Cairns and Atherton, and had been impressed with the courage, heroism, and vision of the people in the face of adverse circumstances in that area in the Central West affected by a seasonal set-back.

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

White Ants Attacking Cane Sticks and Sets.

Damage caused by white ants consists in destruction by the worker and soldier forms of a community of (1) newly planted sets and young shoots arising from same, (2) invasion of the sets and growing cane-sticks from below ground level, or (3) ultimate removal of the entire internal cellular tissue of the sticks, thus reducing such canes to mere hollow tubes, nothing being left of them except the rind.

To control this pest on badly infested land, it is advisable to fumigate the soil with carbon bisulphide or paradichlorobenzene; applying ¼-oz. doses injected 18 inches apart, 6 inches from the plants, and at a depth about level with the sets.

When treating young plant cane be careful not to apply such fumigants closer than 6 inches from sets, and in the case of bisulphide direct the doses parallel to the cane rows, *not towards the plants*. The vermorel "Pal Excelsior" soil injector has proved satisfactory in field work. Secondly, locate position of nest or termitarium if possible, in old stumps, roots, &c., chancing to have been left in the canefield, or in fallen or standing timber occurring close to headlands, and fumigate same when practicable with Shell benzine, Cyanogas, &c. Thirdly, smear poison bait (2½ oz. sodium arsenite mixed with 1 quart of mill molasses) on infested fence posts, pieces of wood or cane, &c. (to act as poison baits on headlands or amongst affected cane plants). Fourthly, avoid planting sets obtained from termite-infested localities.

How Growers Can Check the Weevil Borer.

During the cutting period one has a chance to locate the exact whereabouts of the cane beetle *Rhabdocnemis obscurus* on cane areas affected by this pest. The position of any infestations occurring perhaps for the first time should be carefully noted, and the Entomologist at Meringa Experiment Station advised without delay. Tachinid parasites of this weevil borer will be liberated by the Sugar Bureau free of cost on such affected cane land, on the condition that the grower concerned will agree to leave at least a quarter of an acre of badly bored cane for these parasites to breed in; this area should be allowed to remain uncut for three months or longer, and must on no account be burnt.

One cannot expect to successfully establish these useful parasites unless they be carefully looked after and given a chance to multiply. Indiscriminate burning of the cane in which they have commenced to breed is one of the chief causes of failure to secure the permanent benefit which should necessarily result from liberations of this tachinid fly.

Protect Your Insect Friends.

Do not destroy the soil-frequenting larvæ of beneficial insects that happen to be parasitic or predaceous on cane grubs. Some of the commonest of these may be easily recognised by the following brief descriptions and accompanying illustrations:—

(1) White, maggot-shaped inactive larvæ about an inch long, which when ploughed up are sometimes found attached to dead or dying cane grubs (Fig. 1). These spin cocoons (Fig. 2) from which emerge digger-wasp parasites.

(2) Dark-brown cocoons, from ¾ to 1½ inch long, composed of silk hardened to the stiffness of paper (Fig. 2). These are often exposed by the plough, and contain either male or female digger-wasps (Fig. 3).

(3) Shining white maggots, about 1½ inches in length, but more slender than those of Fig. 1, and able to tunnel with ease through soil by means of a pointed beak (Fig. 4). These predaceous larvæ of robber-flies (Asilidæ) pierce and suck the life juices of various cane grubs.

(4) Large flattened wireworms (Fig. 5), from 1 to 2 inches or more long, having yellowish-brown shining bodies and six small legs close to the head end. These slippery, very active creatures remain in the ground two years or longer before transforming into beetles. They are inveterate enemies of cane grubs, seizing them with their sharp sickle-shaped jaws and then cutting deeply into the body and greedily imbibing its succulent contents.

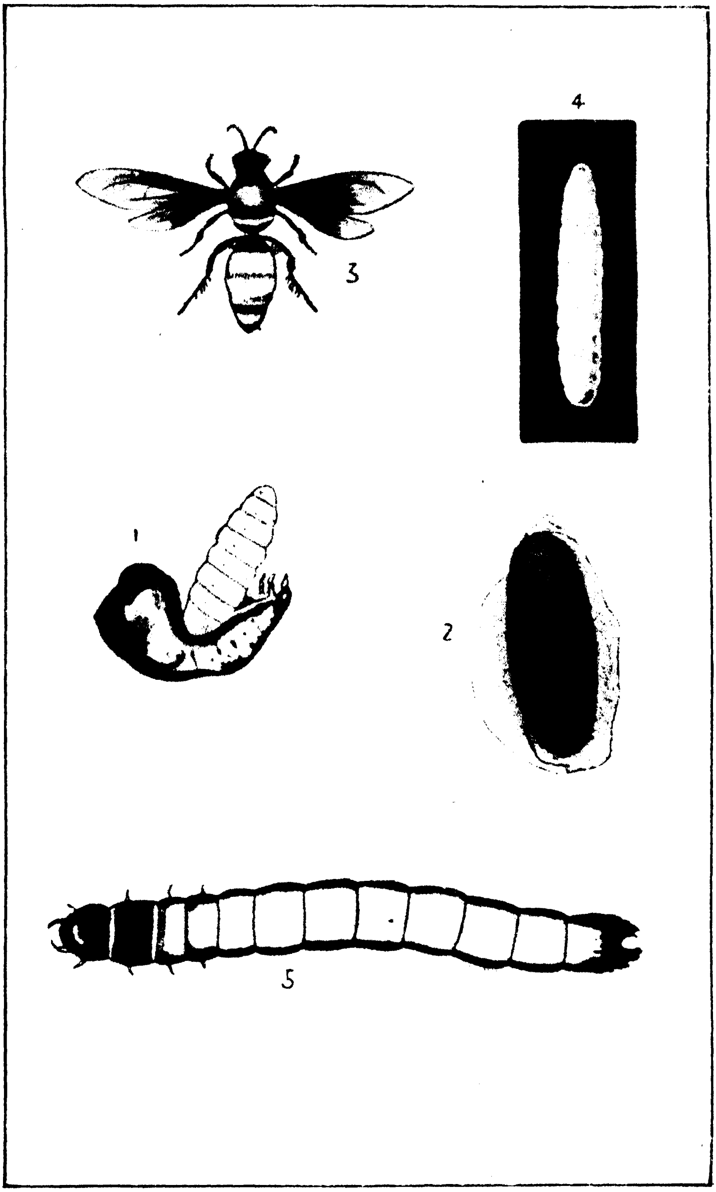


Plate 55.

Fig. 1.—Mature maggot of digger-wasp attached to shrunken body cane grub.

Fig. 2.—Cocoon of digger-wasp, spun by maggot.

Fig. 3.—Digger-wasp (*Campsomeris tasmaniensis*).

Fig. 4.—Soil-frequenting maggot of Robber Fly; predaceous on cane grubs.

Fig. 5.—Soil-frequenting larva of elaterid beetle; predaceous on cane grubs.

TOP ROT IN SUGAR-CANE.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following notes (8th August, 1927) from the Assistant Pathologist, Mr. E. J. F. Wood:—

Investigations to Date.

This disease, which for a long time was known as Burdekin Top Rot, or simply as Burdekin Rot, has caused considerable losses to the farmers of the Lower Burdekin district, and as yet little information of a definite nature has been obtained. This is an attempt to present the facts which are known at the present time, as well as certain theories which the farmers have put forward, and a few ideas which commend themselves to me.

Hitherto the trouble has been practically confined to Badila (N.G. 15), but smaller occurrences have been seen by the author in D. 1135 (not on the Burdekin), M. 1900 Seedling, and rarely in H.Q. 426, where it was very slight. Many farmers have observed it in Rose Bamboo and Striped Singapore.

Cause.

The casual organism was suggested by Mr. Tryon as a septate fungus which he identified on mycelial characters as a Pythium, and which he stated attacked the roots of the cane, the Top Rot being, in his opinion, merely subsidiary.

At the end of 1925, Mr. W. Cottrell-Dormer, of the Bureau, while in Ayr, carried out investigations as to the cause of Top Rot. He has ascertained that the red streaks noticed on the cane leaves are associated with Top Rot as an earlier stage of the latter and that these red-streaked portions contain bacteria. He cultured these bacteria, and by infection of healthy plants with material from these cultures produced the typical red streaks, and later Top Rot as it occurs naturally. He has thus shown that Top Rot is caused by bacteria as the active agent, though there still remains the larger part of the problem—what are the primary factors?

His work was carried out under extreme difficulties, and it is highly creditable to him that he achieved such results with the very limited means at his disposal. Owing to lack of time he did not succeed in isolating the causative organism in pure culture, so that its cultural characteristics still remain a mystery, and we do not yet know its identity. The main object of his investigation, the production of the disease with a culture of bacteria, was obtained.

The symptoms of the disease have been discussed in his work on the subject, so it is unnecessary to mention them here.

Seed Cane.

It has been established beyond doubt that infected plants do not produce infected cane in the resulting crop, and that cane from clean fields will often show up infected in the plant crop. Infected plant cane may give rise to healthy ratoons and vice versâ.

One experiment conducted by Mr. Tower, of Jarvisfield, will be sufficient to illustrate this. Warned by some farmers against planting diseased sets, he selected some diseased and some healthy cane from different fields and planted them beside each other. In the resulting crop both showed equal amounts of Top Rot. Of course, secondary infection could have taken place in this case, but so many other experiments support this one that it may be taken as typical.

Again, a farmer on the Anabranch procured healthy Badila in 1920, and planted it on virgin soil. The resultant crop was about 5 per cent. Top Rot. Next year Top Rot was bad in patches, which died right out. Since then the cane has been healthy till this year, when some Badila plant on new soil is showing bad patches of Top Rot. Farmers all over the district have quoted similar cases.

Conditions of Cultivation on the Burdekin.

As Top Rot is epidemic only on the Burdekin, it will be well to recapitulate the methods of cultivation there, as it seems probable that they have some bearing on the trouble.

As a rule there is a definite wet season at the beginning of the year, with dry weather except for a few isolated rains during the year. It is therefore necessary to water the cane during growth, and this is done by water pumped on to the fields by means of spear pumps. This is done at intervals, and often when rain is expected the irrigation is deferred. Sometimes the rain does not come, and the cane is badly checked. On the other hand, irrigation may be followed by a storm and the ground flooded. So that these conditions are rather unnatural and must be considered in connection with the disease.

It is unusual to ratoon the cane, and plant crops are the rule. On some places first, and on a few second and third ratoons are grown.

In this connection it must be noted that although the cane may be regularly watered, the atmosphere remains dry, and this may be playing a big part in the conditions controlling Top Rot.

Losses Due to the Disease.

These are at times heavy. A crop estimated at 32 tons per acre, grown at Macdesme, became infected and cut 15 tons. Another estimated at 28 tons cut 14 tons. There are farms on the Burdekin which rarely, if ever, are affected, and on many farms infection seems to occur on the same block to a greater extent than on other adjacent blocks.

The farmers are unanimous in stating that they think the trouble to be due to seasonal variations, for in some years there is hardly any loss due to Top Rot, while the next year may show a general infection throughout the district. This appears to point to the fact that there are a number of complex factors involved, as no simple relation between season and disease can be found. A general hypothesis based on the evidence obtained will be given, but it must be remembered that it is probable that it will have to be modified as other facts come to light.

Distribution.

The whole of the Burdekin district is affected to some extent, Badila being the main variety affected. As most of the land is too rich for other canes, which grow rank and lodge, this is serious, and it is hoped that the South Johnstone seedlings will show some resistance to Top Rot and will be able to be used to replace Badila.

Mr. Gibson reports that Top Rot is occasioning some damage at Freshwater, and this is of interest, as it may help to throw more light on the trouble.

Top Rot occurred on the Experiment Station at Mackay after the heavy rains that followed the 1902 drought and wiped out half the Rose Bamboo on the place (I quote "The Director"). It has also occurred on the Herbert, and I have seen signs at Beenleigh during heavy rains following a drought.

Period of Infection.

This is roughly from November to the end of February, and there are two stages of infection:—

(1) When the plant is just beginning to make cane the outer leaves show red streaks, and soon the centre rots. This usually occurs in the leader or first shoot and causes little loss, for the cane stools out from below, and as there are about fifty shoots in each stool, of which only about twenty ever come to maturity, the loss is not noticeable.

(2) The other occurs when there is about 3 to 4 ft. of cane. The red streaks appear, the top dies and rots, and the cane usually side-shoots and may sucker. The cane is healthy below the localised rotted portion and is millable, and can be used for plants.

Possible Theories as to the Immediate Cause.

It has been suggested that the disease is due to the running out of Badila, but this theory is disproved by the fact that the comparatively recently introduced Oba Badila shows Top Rot, and in the Tableland Badila many farmers have reported exceptionally heavy losses. Also the appearance of the trouble in E.K. 28 and M. 1900 Seedling and Q. 813 goes against this theory.

The evidence given above shows that Top Rot is a disease markedly different from the type of disease known as Vascular Disease, which includes Gum and Leaf Scald, likewise bacterial diseases, so that seed selection, the main control measure for these, will not apply in this case.

Another peculiar thing is that from the centre of infection the rot proceeds only for a few joints down the stem and the rest of the stick remains healthy.

Mr. Cottrell-Dormer has given us a bacterial origin for Top Rot, and it remains for us to clear up the factors which control the virulence of this parasite, and also to gain some further knowledge of its habits.

From the attacks in other places we must presuppose the presence of the bacterium over a wide area, and that it requires certain attendant factors for its appearance in epidemic proportions. There is apparently either a case of very balanced parasitism or of a facultative parasitism by an organism which is usually harmless. This will have to be determined in the laboratory, and in the course of these investigations we may be able to derive the source of the organism.

For this there are several possibilities—

(1) That they exist in the soil and are carried up with the cane.

(2) That they exist in the water used for irrigation.

(3) That they are borne by the wind or by insects from plant to plant.

None of these possibilities have been disproved, but No. 2 is unlikely, as there is no irrigation in other districts, and owing to the fact that the young leaves are rarely covered with water during irrigation. Cultural work will perhaps discriminate between these points.

We have, again, a question of resistance and susceptibility, as Badila is susceptible and H.Q. 426 tolerably resistant. Some factor such as the shape of the leaves or their texture may be at work here.

Many farmers hold the opinion that it is a seasonal trouble, but it is peculiar that in the same farm some fields will be affected and others not; then in the next year the uninfected fields may show infection, though it seems, as mentioned above, that certain paddocks show bad infection from year to year.

It seems a plausible theory that rapid growth of a tender growing point after a check allows the bacteria, ready in the crevices of the spindle, to obtain a footing.

The farmers have been asked to give data and to try to clear this point. The case at Mackay and that at Beenleigh fit in with this theory, and many farmers concur with it.

The check may be produced in two ways on the Burdekin—

(1) By rains following a drought, or a period in which the cane has not been watered.

(2) By heavy irrigation after a time when the irrigation has been light or after the cane has begun to wilt. It was ascertained, in conversation with the cane inspector of Pioneer, that on the farms which water regularly the outbreaks of Top Rot are at a minimum.

The following data were obtained from Mr. Munro, of the State Farm at Home Hill, who is, in addition, carrying out experiments in order to supplement them:—

FIELD No. 6—Season 1926-27. Area, 5.7 acres.

Month.	Gallons of water applied.	Rainfall in inches.
June, 1926	680,000	0
July	40,000	0
August	568,000	0
September	0	4.42
October	160,000	0
November	60,000	0.07
December	815,000	3.26
January, 1927	10,000	17.58
February	0	9.73
March	356,000	1.52
April	278,000	0
May	577,000	0
June	0	4.82
July	0	2.74

Top Rot appeared in December and January—i.e., after a watering of 60,000 gallons and .07 in. of rain, followed by 815,000 gallons and 3.26 in.

Here we have definite evidence of a check followed by a drenching and the coincident appearance of Top Rot. As, however, this is an isolated case, care must be taken against drawing any definite conclusions from it, but it certainly seems to fit in with the general hypothesis enunciated above. It is hoped that more data of the same nature will be established at a later date. Any farmers who can supplement these figures are requested to do so.

The farmers on the Burdekin are to be circularised and asked to give a report on a printed form on the times of watering, and as far as possible the amounts of water used, for it is recognised that it is not possible to give an even distribution of water on a field, except in a few cases and in the case of small fields. This will take at least a year to accumulate, but it is hoped that they will prove of value from the practical standpoint, or, at any rate, till the theoretical can be taken up and followed to its conclusion.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available the following report from 15th July to 14th August, from the Entomologist at Meringa, near Cairns, Mr. E. Jarvis, in connection with the control of cane beetles.

Direction of Flight Affected by Topographical Conditions.

Judging by observations made by the writer during 1915 to 1918 it appears very probable that the character of the forest land on both sides of the Mulgrave River, extending from Gordonvale to Deeral, is probably responsible for the invasion of our district by the greyback cockchafer (*Lepidoderma albohirtum*).

Infestation of cane lands around the Mulgrave, for instance, was apparently affected by beetles that did not originate in that locality, but migrated there from extensive breeding grounds lying to the south of Aloomba, between the Malbon Thompson Range and the mountain chain which terminates on the north in Walsh's Pyramid.

Fully one-third of this area of about eighty square miles consists of reserved land, in the vicinity of Tringilburra and Fishery Creeks, which supports patches of virgin scrub and is for the most part uncleared.

Now, the topography of the country in question chances, unfortunately, to favour a north-westerly migration of these beetles, as owing to the position of the Malbon Thompson and Pyramid Ranges the south-east trade wind—being unobstructed in its course—naturally offers every facility for the gradual transportation of quantities of greybacks breeding throughout this vast area towards Gordonvale and adjacent sugar-growing localities.

Flight in an easterly or westerly direction being opposed by mountain barriers, these beetles, after skirting along the base of the ranges, would tend to arrive in greatest numbers at Walsh's Pyramid, from which point the cane lands of Aloomba are only about 1½ mile distant, and in the direct line of migration.

Invasion of this district appears to have followed as a matter of course, about the year 1895, and at first the pest was satisfied to breed among the roots of native food-plants; its grubs, as a matter of fact, having been noticed to occur very plentifully under "blady grass" (*Imperata arundinacea*), which at that time covered large spaces of forest land around Aloomba and Behana.

Influences Responsible for Migration.

The natural laws which govern the migration of certain classes of insects are too varied and complex to deal with in a report of this kind. Such insects, however, including our greyback cane-beetle (when chancing to multiply abnormally over restricted areas) being instinctively aware of the increased danger that invariably threatens crowded numbers, generally seek to migrate when possible in order to ensure wider distribution of their eggs, and establishment of their grubs or larvæ in different classes of soil, thereby reducing the percentage of mortality likely to be caused by birds, parasitic insects, and other natural enemies.

As pointed out in my last monthly report the cockchafer beetle in question, although of somewhat bulky proportions, is well adapted structurally for aerial transportation; in short, it seems likely that its occurrence locally in concentrated numbers should be attributed mainly to influences of a meteorological nature operating in conjunction with such factors as (1) the mechanical condition of soil; (2) character and disposition of timber or feeding trees; (3) the geographical situation of our high lands and mountain ranges, &c.

Growers should bear in mind that the migratory flight described above, has nothing to do with that of the egg-laden females occurring about a couple of weeks later. In the former case—which may be considered as being an irresponsible dispersion or exodus towards fresh breeding grounds—the newly emerged beetles of minimum weight are able to travel considerable distances; whereas the flight, or in many cases invasion of cane lands by mature females seeking to deposit their eggs, must necessarily be far more restricted. An important point, often lost sight of, is the fact that there is always a danger after such invasion that the affected locality may chance to prove a suitable breeding place for the pest, in the event of which it may subsequently become permanntly grub-infested. On the other hand, incursions of a temporary nature may take place, owing to the position of certain feeding-trees or the occurrence of high land in the near vicinity of a plantation happening to arrest the flight of gravid females. In such cases, however, these beetles may not breed there the following season, but pass on to fresh fields.

Reflection upon the significance of the above mentioned influences affecting the aerial movements of our greyback cockchafer naturally leads one to the consideration of the question of its food-plants in relation to grub attack.

When to Destroy Feeding-trees of the Beetle.

In the event of a belt or clumps of timber containing food-plants of the beetle chancing to occur in the midst of, or to separate two adjacent plantations, and to lie in a south-westerly situation about a mile from the southern headland, such trees should be cut down. Similarly, when either one or opposite sides of an area of cane land happen to run in a south-east direction and be closely bounded by forest country, it is often advisable to cut out all feeding-trees, &c., growing near such headlands to a distance of about half a mile from the nearest rows of cane.

On the other hand, when the southern edge of a canefield is bounded closely by forest land extending far to the southward it is not advisable to clear a belt of timber back from such headlands, or to cut down the feeding-trees.

Should grubs occur over an area of cane land chancing to be more or less surrounded on all quarters except the south by timbered mountain ranges, destruction of the food-plants of this bettle would, if practicable, not only entail considerable labour and expense, but be likely in many cases to prove ineffectual as a control measure. Such cul-de-sacs or small pockets usually become grub-affected in the first place as a result of the arrival of beetles migrating from the south-east, which are forced to come to rest upon timber fringing the base of these ranges. Finding the situation suitable for breeding purposes, and that further progression towards the north, east, and west is more or less obstructed by mountainous country, they generally become established in such localities and regularly damage the cane each season.

In permanent infestations of this kind the best plan is to prevent excessive multiplication of the beetles by collecting them durng the so-called flighting period, either from native food-plants or from trap-trees grown especially for this purpose, and by picking up the grubs during the course of cultural operations.

By exercising common-sense methods of this sort it should be possible on such cane areas to ultimately reduce the grub pest to harmless proportions, seeing that the fields are practically closed from further invasion from all quarters but the south.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (23rd July, 1927) from the Entomologist at Meringa, near Cairns (Mr. E. Jarvis), dealing with (1) various influences affecting the numerical increase of the greyback cockchafer during the period of its aerial existence; and (2) activities of the Meringa Experiment Station for the past month, June to July, 1927.

THE GREYBACK COCKCHAFER.

(1) Hints on Control Derived from Study of the Organs of Flight.

Our canegrowers have often displayed curiosity regarding the probable range of flight of our principal cane beetle, being anxious, perhaps, at times to satisfy themselves that no danger of grub-infestation need be feared from the presence of belts of timber chancing to occur in the vicinity of their cane land, which might contain feeding-trees of the beetles.

Egg-laden females of *albohirtum*, however, probably seldom fly, at a single stretch before coming to rest, farther than about one-half to three-quarters of a mile;

and should obstacles, such as high ground (volcanic ridges) or well-grown ratoon or standover crops of cane be encountered in their line of flight the beetles, instead of continuing on the wing, are far more likely to remain and oviposit in such situations. In the event of a plantation of young cane from 6 to 12 inches high happening to lie between them and a block of standover cane they will generally pass over the former and come to rest amongst the older mature crop.

Evidence of such selection is not uncommonly met with, and doubtless affords an explanation at times as to the reason why (some months later) one notices the cane on certain areas succumb entirely to grub injury, while that alongside, divided from it by only a few feet and growing on the same land, remains quite free from attack.

Up to the present no experiments on an extensive scale have been undertaken by us to determine the average distance our greyback is able to travel. The question, after all, is not one of great economic importance, and can be approximately decided without having recourse to experiments which would necessarily be of a costly nature.

With regard to the flight of the female when ready to oviposit, we may reasonably assume that the distance it would be likely to fly would be much the same as that traversed under similar circumstances by the common European cockchafer, *Melolontha* (*vulgaris*) *melolontha*.

Queensland and European Cockchafers Compared.

This latter beetle, *M. melolontha*, which is similar in size to our own *albohirtum* (1¼ inch long), and belongs to the same sub-family *Melolonthidæ*, is of a light-brown colour with a series of little white triangular marks along the sides of the body. (See Figs 1 and 3 of this species and its grub on the accompanying plate.)

So closely is this European insect related to our own greyback cockchafer, that, while the latter species (as observed by the writer during the last twelve years) lives only three or four weeks, we find that the adult *Melolontha melolontha* (according to Labitte) lives for thirty-one days; so that the longevity of these two cockchafers during their aerial existence is practically the same. It is interesting to note that in Germany experiments have demonstrated that *M. melolontha* is unable to fly a greater distance than 1,100 to 1,650 yards before coming to the ground.

Judging by the scanty data obtained by us in this connection it appears probable, therefore, as already mentioned, that the above distance would be likely to apply also to the flight of egg-laden females of our own cockchafer, *albohirtum*.

Record Capture of 15,000 Tons of Cockchafers.

It should be mentioned, as a further illustration of the similarity of habit between the two species of beetles in question, that in 1866 the authorities of the Seine Inferior (as reported by Edward Step, F.L.S.) estimated the loss to the growers from the grubs of *melolontha* at about £786,000. In Saxony, two years later, 15,000 tons of the beetles were collected and paid for, and it was found that the total number thus destroyed was not fewer than 1,500,000,000 of cockchafers. Some idea of such a vast number may be realised from the fact that these beetles, if placed end to end in close contact, would be sufficient to encircle the entire world in an unbroken line around its circumference at the equator, which is 24,000 miles; and there would still remain enough additional beetles to extend this distance for another 4,000 miles if needs be.

We Must Protect our Insectivorous Birds.

The chief reason for British immunity during most seasons from such serious grub damage as occurs on the European continent, is to be found, it is stated, in the protection and love manifested by English people for the birds which help to keep down the numbers of these chafers. Queensland growers would do well to cultivate a similar regard for the numerous species of birds which help so greatly to thin the ranks of our most formidable beetle pest.

In England, owls, nightjars, and bats destroy great numbers of cockchafers, and it is said that starlings may be observed at the time when these beetles are emerging from the soil watching for them to crawl up into daylight so that they might capture and eat them. Rooks, on the other hand, do not wait for development of the beetle condition, but are said to plunge their bills into the ground and drag out the mature grubs.

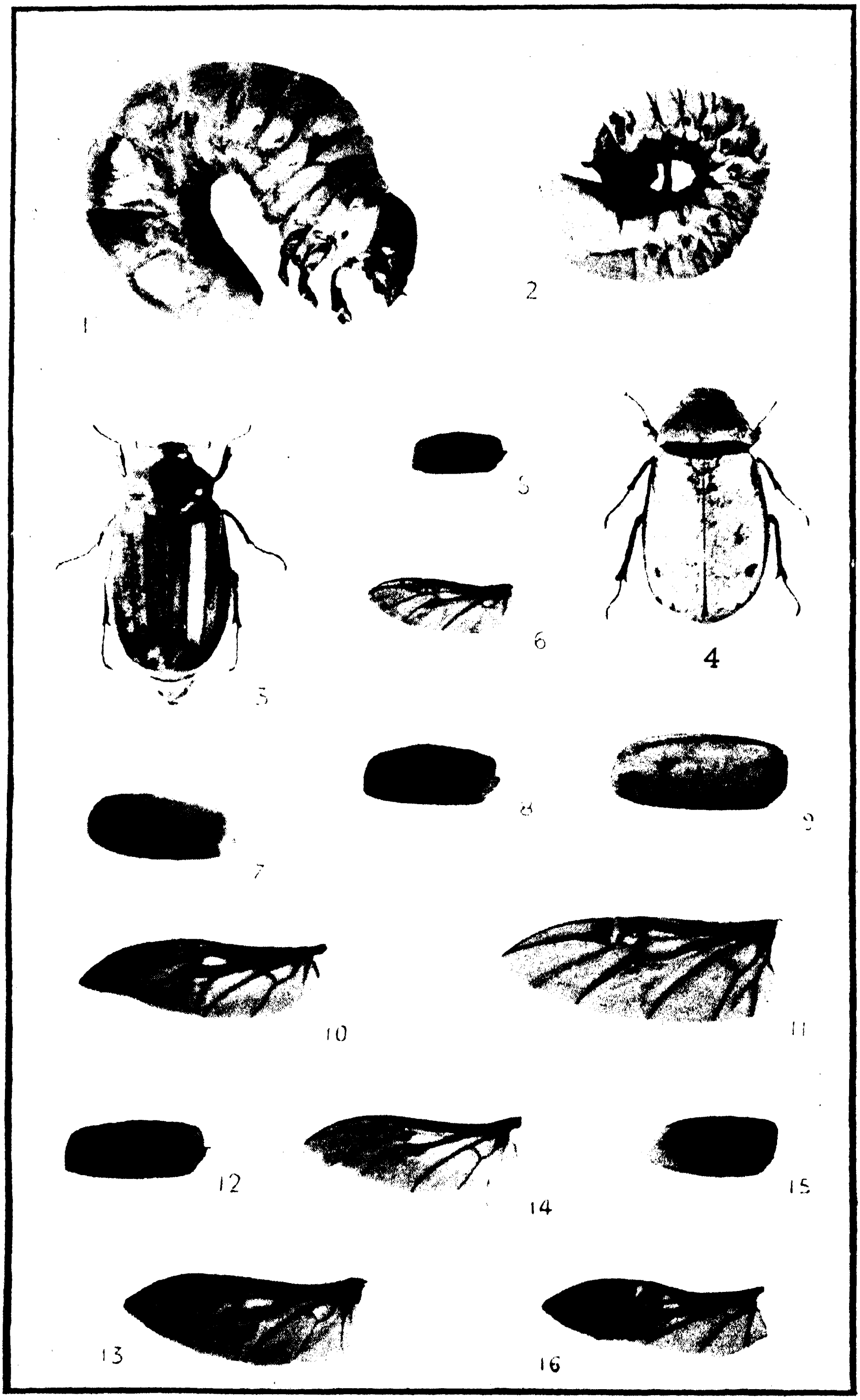


Plate 56.

The European Cockchafer compared with our Queensland "Greyback," together with Wings and Elytra of our Chief Cane Beetles.

(For description of plate, see page 215.)

Powers of Flight Dependent on Structure of Exo-Skeleton, &c.

Special attention has been given by the writer to the external anatomy of our greyback cockchafer, which seems, indeed, to have been specially fitted by nature for wide dissemination or aerial transportation. In addition to exceptional lightness in weight, careful provision has been made for periods of extended flight; the wing-cases of elytra (Fig. 9 on plate) which are unusually light in proportion to their size, being deeply concave below, so that while the beetle is using its powerful wings its elytra project laterally, parachute-like from each side of the body, thus aiding the insect to maintain a steady course, and also giving it buoyancy.

A greyback beetle weighs little more than 1½ scruples when alive, and a dried specimen only 10 grains (¼ scruple).

Although *Anoplognathus boisduvali* turns the scale at 7 grains (a dried specimen) and possesses but two-thirds of the bulk of the latter insect, the wing surface of *albohirtum* is 836 sq. mm., and that of *boisduvali* 450 sq. mm. (much smaller proportionally than in *albohirtum*).

By comparing the wings and elytra of our scarabæid cane beetles (shown on the plate) it will be noticed that *Lepidiota consobrina* Gir. comes next in size to *albohirtum*, with a wing surface of 750 sq. mm., its body weighing a little less than that of the greyback.

Lepidiota caudata (Figs. 7 and 10) is apparently more fitted for aerial progression than *L. consobrina*, being lighter than that insect in proportion to its bulk, while possessing also broader elytra, and nearly the same wing expanse.

Lepidiota frenchi is just half the weight of *albohirtum*, but has a superficial wing measurement of 540 sq. mm., which happens to be greater in proportion to its bulk than that of the greyback. Owing to its erratic aerial movements, however, which consist, during the mating period, of short irregular flights in different directions, *frenchi* cannot be considered as being a migratory beetle although apparently enjoying a fairly wide range of distribution.

(2) Activities in Connection with Experimental Work.

It is regrettable to state that, owing to drought conditions having delayed planting up of our Meringa experiment plots, a decent strike was not secured until the beginning of February. Growth of the young shoots from deeply-planted sets was severely checked by the cyclone and flood rains, occurring on the 9th and 14th of February, respectively, which filled the planting furrows, nearly burying the tender shoots, and leaving the surface of the ground as uniformly level as a table. Further trouble was subsequently caused by stray horses getting into the selection on which these plots are situated—probably through portions of boundary fences that had been damaged by the cyclone—and eating down the young cane.

Despite such unfavourable conditions, however, two of the test plots have given encouraging results, viz.—that treated with "Chlorocide B"; and the one fumigated with paradichlor., applied by horse power. Both these experiments are well worth repeating next season. The results of other fumigants tested, such as "Chlorocide A," Carbosyl, calcium cyanide, &c., were rendered inconclusive owing to the various causes above mentioned.

REFERENCE TO PLATE.

Fig. 1.—Grub of *Melolontha melolontha* L. European Chafer, about 1½ times natural size.
Fig. 2.—Grub of *Lepidoderma albohirtum* Waterh. Queensland "Greyback" Cockchafer, natural size.
Fig. 3.—*Melolontha melolontha* L., natural size.
Fig. 4.—*Lepidoderma albohirtum*, natural size.
Fig. 5.—Elytron (wing case) of *Lepidiota rothei* Blkb., natural size.
Fig. 6.—Wing of same, natural size.
Fig. 7.—Elytron of *Lepidiota caudata* Blkb., natural size.
Fig. 8.—Elytron of *Lepidiota frenchi* Blkb., natural size.
Fig. 9.—Elytron of greyback cane beetle, natural size.
Fig. 10.—Wing of *Lepidiota caudata*, natural size.
Fig. 11.—Wing of greyback cane beetle, natural size.
Fig. 12.—Elytron of *Lepidiota consobrina* Gir., natural size.
Fig. 13.—Wing of same, natural size.
Fig. 14.—Wing of *Lepidiota frenchi* Blkb., natural size.
Fig. 15.—Elytron of *Anoplognathus boisduvali*, natural size.
Fig. 16.—Wing of *Anoplognathus boisduvali* Boisd., natural size.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Assistant Pathologist, Mr. E. J. F. Wood, B.Sc., for July-August on the Ayr and Burdekin district.

BURDEKIN.

On the Burdekin, two diseases are startingly prevalent—Top Rot and Leaf Stripe. The former affects Clark's Seedling and Badila, mainly the latter variety, and the latter B. 208.

The disease known as "B. 208 disease" is in reality Leaf Stripe, and is a very serious matter. There is no denying that the days of this variety in this district are numbered, for on the majority of the farms the B. 208 is affected. Moreover, the disease is spreading into Goru, Badila, and other varieties, and unless something is done the position will become acute. All the advice that I can give to the farmers is to plough out the B. 208 in the district as soon as it is harvested, and to refrain from planting any of it. Such as is planted should be got rid of at the next crushing. With the piesence in the district of such good canes as E.K. 28, Q. 813, Goru, and H.Q. 426, there is no excuse for the propagation of such a notoriously susceptible cane as B. 208. It will not come hardly on any farmer to discard this cane, which can only serve as a source of infection to the other and better canes, and may in time cause all the varieties in the district to be infected—a sad state of affairs.

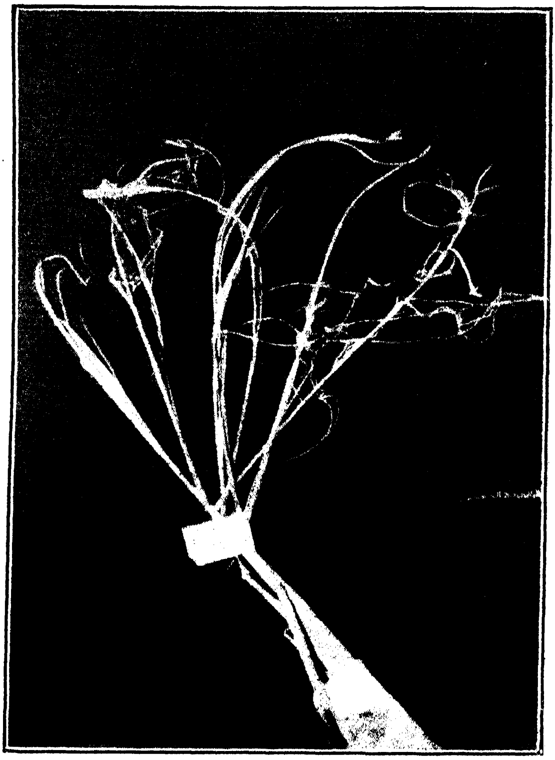


Photo.: E. J. Ferguson Wood

PLATE 57 (Fig. 1).—A LATE STAGE OF LEAF STRIPE.

Note the thin nature of the stick, the shredded leaves which are practically dead and shrivelled.

There is hardly any need for me to give the symptoms of the trouble, as it is well known to most farmers. But, as there are some who may not know it, they are:—

An elongation of the stick affected. These long sticks can be identified easily; in fact, I have picked them out while riding along a road on a motor cycle at dusk. They will have stunted and dying tops, and the leaves will shred up into strands.

Examination of the leaf will show a series of whitish to yellowish stripes, which turn brown on the older leaves. These on the backs of the leaves show a white mould which consists of millions of minute spores or fruit, about 1/1,000 the size of a pin's head. It is an easy matter for these to be carried by a wind for considerable distances, and this is how the disease travels from an infected field. Another source of infection is the planting of diseased cane, and to this is probably due the fact that B. 208 often strikes badly, for one would not expect badly diseased sticks to grow.

Photo.: E. J. Ferguson Wood.

PLATE 58 (Fig. 2).—LEAF STRIPED AND HEALTHY CANE.

The two sticks are the same age. The one on the left is diseased, and shows the extreme elongation, and cancered nature of the stem, the sparse leaves, which are beginning to shred. The one to the right is normal, with green healthy top, and full stick of normal length.

If you have the disease in other varieties, it will pay to dig out the diseased stools, and on no account to plant them.

With regard to Top Rot, this disease has been shown by Mr. Cottrell Dormer, of this Bureau, to be due to bacteria, and it is strongly suspected that bacterial entry is effected subsequent to a check in the growth of the cane. This would account for the fact that on some farms and during some seasons the disease does not occur, and also for the fact that it occurs only in some sticks in a stool. The prevalence of the disease in Badila may be due to some peculiar formation of the leaves or some such varietal peculiarity.

The only advice that I can offer the farmer concerning this trouble is to try and arrange that the water is applied to the fields regularly, and to minimise all checks to the growth of the cane, as all the evidence that I have been able to obtain seems to point to the fact that the disease occurs in young, tender tops growing too weakly after a check due to drought. Some data has been collected, and the farmers are to be asked to supplement it as far as possible. It is hoped that they will realise the necessity and do so.

Mosaic disease is present on both sides of the Burdekin, to a limited extent it is true, but owing to the rapidity with which the disease spreads, every effort should be made to check the trouble before it becomes epidemic. It is occurring in E.K. 1, Clark's Seedling (H.Q. 426), and in Badila and Tableland Badila in limited areas; but the worst infection and that most to be feared is the infection of B. 208. It was partly owing to Mosaic that this variety was discarded on the Herbert River. On many farms this disease was noticed in sorghum, Sudan grass, and Guinea grass, and also in corn. This tends to prove that it is dangerous to grow corn and sorghum, and that all headlands should be kept clean from the grasses which can carry infection from cane to cane. It is also noteworthy that these pests were worst on the farms that were showing Mosaic infection in the cane. This is no idle theory,

Photo.: E. J. Ferguson Wood.]

PLATE 59 (Fig. 3)—LEAF STRIPE IN POMPEY (7R. 428).

Note that the diseased cane marked "X" is much longer than the rest of the crop.

DENHAMS

LIMITED

Roma Street, Brisbane

Manufacturers of Chick, Calf, Cattle, and Pig Foods

The Formulas, as required by "*The Stock Foods Act of 1919,*" have been deposited with the Department of Agriculture and Stock.

We invite you to compare the ingredients, also Analyses of Foods, with other Stock Foods on the market. We confidently assert our Foods are better value.

CALF FOOD

Ingredients—Wheat Meal, Pollard, Oat Meal, Barley Meal, Maize Meal, Linseed Oil Meal, Meat-Bone, Blood Meal, Cod Oil.

Analysis—Crude Protein: Min., 15%; Crude Fat: Min., 5%; Crude Fibre: Max., 7%. **Price**—21s. per 100-lb. bags; 11s. 6d. per 50-lb. bags; 6s. per 25-lb. bags.

GROWING MASH

Ingredients—Wheat Meal, Bran, Pollard, Barley Meal, Rice Meal, Maize Meal, Linseed Oil Meal, Meat-Bone, Blood Meal, Salt, Sulphur.

Analysis—Crude Protein: Min., 15%; Crude Fat: Min., 4%; Crude Fibre: Max., 4%. **Price**—14s. 6d. per 100 lb. bags.

LAYING MASH

Ingredients—Wheat Meal, Bran, Pollard, Barley Meal, Rice Meal, Maize Meal, Linseed Oil Meal, Lucerne Meal, Meat-Bone, Blood Meal, Salt, Sulphur.

Analysis—Crude Protein: Min., 20%; Crude Fat: Min., 6%; Crude Fibre: Max., 9%. **Price**—14s. 6d per 100-lb. bags.

CHICK FOOD

Ingredients—Wheat kibbled, Maize kibbled, Linseed Oil Meal, Meat-Bone, Blood Meal, Japanese Millet, Panicum.

Analysis—Crude Protein: Min., 14%; Crude Fat: Min., 6%; Crude Fibre: Max., 4%. **Price**—16s, per 100-lb. bags; 8s. 9d. per 50-lb. bags.

Barley Meal, £10 5s. per ton.
Maize Meal, £10 per ton.
Protein Meal, £14 per ton.

FARMERS!

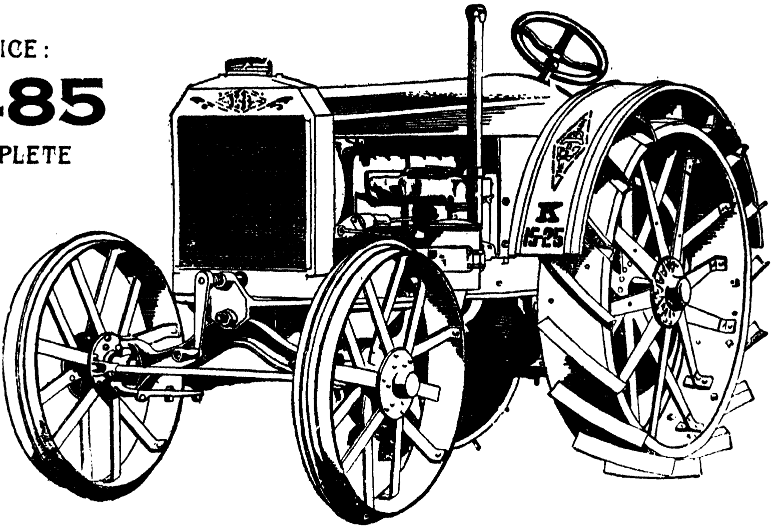
You will need a man-size tractor this year

PRICE:

£485

COMPLETE

"The
King
of
all
Tractors."



E-B 15-25 Farm Tractor is the most economical Tractor in the World for draw bar pull. 10 years of dependable farming. Write for specifications and terms.

ESTABLISHED 1900

AUBURN CARS

OFFER BETTER VALUE FOR 1927 THAN ANY OTHER AUTOMOBILE COMPANY

So sure are we that it will exceed anything that you have ever experienced before, that we invite you to test it. If it does not sell itself, you will not be asked to Buy.

COMPARISON PROVES

NOREMAC MOTORS LTD.

MAKERSTON STREET, BRISBANE

for it has been proved over and over again in Queensland, while Louisiana is an extreme example.

The farmers on the Burdekin have the idea that their district is almost free from disease, and tend to disregard Mosaic and Leaf Stripe, but I have not found the area nearly as free as some other districts.

In the Ayrdale and Maidavale areas Mosaic and Leaf Stripe are present, the latter being serious in some cases.

Pioneer, Brandon, and Colevale are very clean, but Top Rot and Leaf Stripe are present to some extent.

Jarvisfield and Macdesme have Top Rot on most of the farms, and it is doing considerable damage this year.

Rita Island and the Inkerman area are the most free of disease, and farmers can fairly safely get seed from these.

Airdmillan and Kalamia have Leaf Stripe in B. 208 and 7 R. 428 (Pompey).

Along the river on the Home Hill side Mosaic and Leaf Stripe and Top Rot are bad in patches, and the farmers are warned that B. 208 is a dangerous cane for both these diseases. It is also a hard cane to grow, and side-shoots badly; so that, despite its high density and good tonnage under favourable circumstances, the farmers would probably find, if they went into the matter, that it also costs more to grow than the other canes. Mosaic causes very great stunting in growth in this variety, and considerable losses may be expected if the disease spreads.

With regard to varieties, Badila is resistant to Mosaic and Leaf Stripe, E.K. 28 possesses tolerable resistance, and these can be grown on the rich river soils. For the forest soils, Q. 813 is strongly recommended as a resistant variety, and E.K. 28 is also a good cropping cane on poorer classes of soil. The varieties Korpi, Nanemo, and Oramboo are now in the district, and several good crops of the first mentioned are being grown. The resistance of this variety has still to be tested.

GIRU.

Many of the remarks that have been made with regard to the Burdekin apply here, especially with regard to B. 208. This cane is not, in my opinion, worth the trouble taken to grow it, and I feel sure that a crop of Clark's Seedling will be found to give better returns over a period. It is almost impossible to get a satisfactory ratoon crop of B. 208 on the Houghton, and it is the ratoon crop that pays. Even the plant crop, if it receives a check, side-shoots badly and spoils the crop. Moreover, it is almost impossible to grow a succession of crops without their becoming affected with disease. Leaf Stripe has been seen on several farms on the river, and in one case a bad infestation of this disease and Mosaic were seen on a field adjacent to one 16-acre block of B. 208. The chance of a good crop from this field is small indeed.

Mosaic is present in B. 208 on several farms along both sides of the river, and one field was 100 per cent. infected. There was a 40 per cent. strike, and only four sticks on a 4-acre block were found to be sound. The rest was stunted and the cane not worth harvesting. If farmers could see this field, it would be a warning to them against B. 208.

Top Rot occurs in Badila which had been under the floods at the beginning of the year and which followed the long dry spell. The disease is worst in the hollows where the waters lingered, and the occurrence fits in with the theory that it shows up in cane in which the growing point is tender after a long check.

Sclerotial disease is also present in B. 208, H.Q. 426, and Badila often in the same fields as the Top Rot, but can be distinguished by the fact that in this trouble the leaf sheaths are scarlet and tightly bound, the top being spindly and finally choking, giving an appearance very similar to Top Rot. It is caused by a fungus in the leaves and leaf sheaths. The leaves themselves show a pinkish tinge running about 3 in. up from the sheath, while Top Rot is distinguished in the corresponding stages by blood-red streaks in the leaves and of considerable length.

The farmers of this area are warned against the practice of getting plants from the Ingham line, owing to the risk of bringing Gumming disease from there, for it is not yet prevalent at Giru. This is important, and the idea of getting varieties from trucks in the mill yard should also be abandoned for this reason.

Grubs are doing considerable damage on a few farms on the Houghton, and an occurrence of wireworm has been reported to me.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available the following report of Mr. R. W. Mungomery, the Southern Assistant Entomologist, from 14th July to 15th August.

BUNDABERG.

Insect ravages in the Bundaberg district have been comparatively small during the past few months, so that no artificial control measures have had to be resorted to. This freedom from pests at the present time is probably due to two causes—(1) Hibernation, and (2) the relative scarcity of the major cane pests in the Bundaberg district.

Hibernation is the term applied to the dormant condition of certain insects or animals during the cold weather, and this overwintering may take place in either the egg, larval, pupal, or imaginal stages, accordng to the insect under consideration. Some insects hibernate on account of the scarcity of their particular food plant, but on the whole, those cane insects which do hibernate, do so as a protection against the extreme cold, and not through any scarcity of their food. A well-known example is the case of *L. frenchi*, whose grubs hibernate in the second stage at a depth of about a foot or more in the soil. At the end of this quiescent period they moult and change into the third stage, resuming their destructive activities in the months of September and October. Farmers frequently plant their cane in August, thinking that by the apparent absence of grubs they have none to worry them, and it comes as a surprise to them to see their young cane yellowing in the summer months, and to find that grubs really are present, in which case the true cause is explained by the above facts.

Although we have in Bundaberg most of the serious cane pests which give trouble in the neighbouring cane-producing districts, yet it has frequently been a subject of comment that this place at present enjoys comparative freedom from these pests. This is no doubt due in a large measure to the scattered nature of the district, farms being in most cases situated close to large stretches of scrub and forest, which provide shelter and nesting grounds for insectivorous birds. Chief amongst these are the ibis, crow, pee-wit, magpie, butcher bird, and the sea-gull, the latter being confined mainly to the coastal section, and they are all useful in destroying soil-frequenting insects, which are the chief source of annoyance to the cane farmer.

Pests Checked—The Farmer's Feathered Friends.

Through the activities of birds and parasites chiefly, and in a lesser degree due to outbreaks of fungus and bacterial diseases, pests have not been able to increase in sufficient numbers to regain the ascendency and to occasion serious, or in certain cases, even noticeable losses. In expressing this the writer has in mind the cane grub *Pseudholophylla furfuracea* Burm. In past years this grub was reported to have caused considerable damage in parts of the Woongarra district, but unfortunately it now remains in minor importance. Contrast this with the position of the same grub in the Isis district, and it will be seen that a totally different state of affairs prevails there, where it is a serious limiting factor in cane production on many farms. The Isis district is much more hilly than the Woongarra, but otherwise conditions seem to be identical, such as the same red volcanic soils, and the bird and insect fauna would also appear to be similar. The question then arises why should the Woongarra district enjoy apparent immunity from *furfuracea* grubs whilst the Isis district is in parts heavily infested; and this becomes one of the problems that the entomological worker is called on to elucidate. It is not a straight-forward matter which can be answered at once, but it will probably involve years of work in studying the economic conditions governing the increase of our effective parasites. All this and probably more must be attempted before any definite and clear solution can be given which will satisfactorily explain the state of affairs existing at the present. Then only may we be in a position to recommend some measures that would preclude the necessity for fumigation, which involves a considerable outlay of money in providing injectors, fumigants, and labour.

Pests and Their Natural Enemies—Need for Discrimination.

Going back to our comparison between conditions in the Isis and Woongarra districts, we find that in the former payment is made for the collection of grubs, and for this purpose children or boys are employed to follow behind the ploughs, collecting them as they are exposed by each furrow. This practice evidently is not considered necessary on the Woongarra farms, and the benefit, if any, should be with the Isis farmers, but this certainly does not appear the case; therefore weak points in the system must be looked for and rectified. Doubtless there are several other contributory causes, but the following appears to be very evident, and to be a factor of great importance in this connection—namely, that little discrimination is made between parasites, predators, and the actual grubs themselves. All go into the collecting tin, to be paid for at so much per pint or quart, and as they all help to fill up the tin, beneficial insects as well as harmful ones are destroyed in this way. This has a reflex action in that these insects would in the ordinary course of events attain the adult stage and their progeny attack more grubs in the field, and so establish a natural biological control. By destroying them the activities of each species are curtailed. Digger wasp (Scoliid), Robber fly (Asilid), Carab, and predaceous Elaterid larvæ all come under the category of useful insects and should be protected.

Useful Insects Need for Recognition.

When the writer inspected the Isis cane fields for the first time he was impressed by the scarcity of parasites, &c., and in a report to the Director stated, "Too much cannot be expected from natural parasites. . . . These are remarkably few in numerical strength at present." At that time the position, as far as parasitic aid was concerned, seemed rather forlorn, but he pointed out to many of the farmers several of the useful insects, which they had previously regarded as pests. These some of the farmers have guarded very religiously, and there is a noticeable increase on many of their holdings. It was particularly encouraging to notice one field which last year carried a heavy infestation of grubs was this season very free from grubs, and Asilid larvæ, or "concertina" grubs as one farmer aptly designated them, were present in hundreds. Of course to arrive at hasty conclusions does not provide a very sound basis on which to work, but knowing the voracious habits of these long white maggots it is only reasonable to assume that they in no small measure accounted for several of the cane grubs, and helped to clean up the field.

This is only one case cited out of several, and the presence of numbers of predaceous wireworms in the Bundaberg cane lands, with their freedom from grubs, would help to establish their claim as valuable friends of the farmer.

This advice then, is given with the intention of impressing on farmers, who in their turn should instruct boys collecting grubs, the necessity for recognising their insect friends, and allowing them to remain undisturbed in the soil. Honorary receivers, by refusing to accept quantities of grubs in which were mixed beneficial insects, could do much in tightening up the apparent looseness that now exists as far as friendly insects are concerned, and it behoves everybody to co-operate in every possible way to bring about a more effective natural control.

FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports (25th July, 1927):—

Bucca.

It is some years since the tonnage per acre equalled the present one. This is due to several important factors—namely, good rains early in the year, fertilizing, improved cultivation, and draining. Growers deserve their measure of success, for they are certainly a progressive group. There is still a fair amount of draining required in this area, as well as other districts, so that the following remarks on this phase of farm engineering may be of use.

The Objects of Draining.—The principal objects of draining are: To carry off stagnant water, to prevent the rise of springs, to allow the escape of excessive falls of rain, to render the land sufficiently dry for cultivation, and, at the same time, regulate the supply of moisture to the growing plants.

Thorough drainage not only lets surplus water out of the soil, it also greatly mitigates the effect of dry weather; when land is soaked with rain and dried by evaporation the soil becomes extremely hard.

Digging the Ditch.—The digging should commence at the lower end and proceed uphill, so that the land to be dug will be dry or practically so. It is important that the bottom of the drains should be properly graduated. A simple method of testing the fall is to pour water into the drain and note any interruptions in the flow. When the drains are deep and the sides likely to fall in the earth should be taken out of the whole length of the drain within a foot or two of the intended depth, and then the bottom spit can be taken out and the laying of the pipes and the bottoming all completed in one day.

Size of Drain Pipes.—As regards the size of drain pipes it is important that the capacity should be in proportion to the amount of water they have to carry away. When drains are long, pipes of different diameter should be used, the largest size being at the point of discharge. As proof of this it can be pointed out that if a drain is 500 yards long, and the distance between drains 8 yards, the pipe at the mouth must be able to discharge all the water drained from the 4,000 square yards of land, while at the middle of the drain the pipe will only have to take the water from 2,000 yards. The following conditions influence the size of drains:—

> Length of drain; depth of drain; velocity of fall; distance between drains; nature of soil (porosity, &c.); daily rainfall; spring water; and evaporation and vegetable requirements.

Laying the Pipes.—The laying of pipes, if not done by the farmer himself, should be entrusted to a careful workman paid on day wages, as more attention is paid to the performance of the task than if done by piecework.

The pipe layer must be careful to see that the bottoms of the drains are of stipulated depth, and properly graduated before he lays a single pipe, and when finally placing the pipes should pack in with "blinding" before the drain is hurriedly filled in. The pipes should be laid as close and tight as possible, and the clay carefully packed around them to keep fine particles of earth from washing in. There is no danger that the water will not find its way in. A plan should be kept of the system.

The subject of drainage, a very large one, will not be further touched upon in this report, but for further information growers are recommended to communicate with the Director of the Bureau. Drainage is so important to the sugar grower that, where necessary, it should not be neglected.

In the Bucca district, growers are obtaining good results from complete manures containing a predominance of potash. It is recommended that experiments be tried on lines laid down in last month's report.

Varieties doing well are M. 1900 Seedling, Q. 813, H.Q. 285, and D. 1135.

Goodwood.

This red volcanic soil area is yielding a good crop this season. Varieties making good growth are E.K. 1, E.K. 28, H.Q. 285, M. 1900 Seedling, D. 1135, and Uba. Growers are recommended to practise lengthy, systematic fallows of the land, as this is the best method of combating root rot disease, which is prevalent in this area.

Gin Gin.

It is said that fortune favours the brave, and it must be said that the growers in this area, having shown great courage and resource in meeting their difficulties, have been rewarded with an excellent crop. The variety probably looking the best is the M.1900 Seedling. H.Q. 285 is showing good results; also D. 1135 and Q.813. There is a certain amount of Mosaic to be combated, but this only presents a real problem on the Burnett River. It will mean disaster to the growers in this latter locality if they neglect to be careful in plant selection, but with reasonable care in this respect the disease is readily enough controlled.

Growers are advised to plant buffer strips of the immune variety Uba round their headlands, and if they cannot mill this cane it always makes excellent forage. The reason for making this suggestion is that the other canes would not be so closely in contact with disease-carrying grasses.

Maroondan.

The cane in this district looks well also. This black soil is very productive, provided it gets fair rains, and these, fortunately, have fallen this year. Provided no late frosts occur, the growers are assured of good crops. Cane varieties doing well are H.Q. 285, Q. 813, and M. 1900 Seedling. Disease does not present a problem here, but, nevertheless, the growers are reminded that, in common with other areas, the principal cane maladies are present, furnishing evidence for incessant care in plant selection.

Bingera.

Cane varieties doing well here are N.G. 16, Q. 813, Q. 855, Q. 812 A, Black Innis, and H.Q. 285. The first named is giving excellent results as a standover, particularly that which has been fertilized with molasses. There is no doubt that this product greatly improves the texture of some soils, as marked results from its use have been obtained in Queensland. Q. 812 A is an excellent cane, very like Q. 813, excepting that it is a slightly heavier stooler, with a greener foliage and leaf sheath. It is a cane worth carefully watching.

Good enough to Practice on!

HOW often has one heard this remark with reference to an old and worn out piano? If only a little careful thought were given to the subject, it would soon become obvious that a Kiddie cannot possibly be expected to make progress if hindered by a poor piano.

What's the use of helping with one hand by engaging a good teacher and hindering with the other by forcing the youngster to practice on an instrument that will perhaps ruin sense of tone and touch.

Remember a good piano encourages—a poor one discourages!

PALINGS'

have a large and representative range of high-grade pianos, from the Belling at its remarkably low price to the illustrious Bechstein. There is an instrument for every purpose and purse.

The deposits are as low as £8, and four years' terms, with easy monthly payments, are available. Call and inspect the Pianos and get full particulars of the prices, etc., or write for free catalogue and price list.

Palings

Established 1853.

BRISBANE
TOOWOOMBA
ROCKHAMPTON
TOWNSVILLE

COW PEAS. As a green fertilizer these cannot be beaten. I have stocks of prime Blacks, and price is right.

SEED MAIZE. I have a nice selection of 90-day and other varieties.

Write—

W. A. FORTH, ***Agricultural Seedsman***
Upper Roma Street, Brisbane

Reliable——Responsible——Punctual

There is Money in Trees!

By Investing in the Largest Commercial Company in the World.

N.Z. Perpetual Forests Ltd.

PAID UP CAPITAL	£128,650
BOND CAPITAL EXCEEDS	£2,250,000
TRUSTEE RESERVE FUNDS representing One-third on all fully paid Bonds to 1st July, 1927	£52,641

Like all Successful Companies, Imitators speedily arrive, therefore the ***public are warned*** *not to confuse the securities and protection of the* ***N.Z. PERPETUAL FORESTRY Ltd.*** *with any other Forestry Company.*

Write for Illustrated Booklet.

Smith, Wylie & Co. Ltd., Griffith House, Brisbane.

Name..

Address..

If Disinfectant has to be used, USE THE BEST—a few good ones to select from

CN DISINFECTANT very strong, 25% Cresols.
Sidolia contains 10% Cresols.
Bestyette contains 12% and 2% Cresols.
Cidol for the Cockroaches.
Solution "D" for the Bed Bugs and their eggs.

We are sole agents for the above and will be delighted to supply you with any further information. Just write us. All above guaranteed by us.

NORRIS AGENCIES LTD., 639 Ann St., Valley

The Southern Field Assistant, Mr. J. C. Murray, reports (17-8-27):—

During the period 14th July to 13th August work was carried out in the Childers, Maryorough, and Pialba districts. In addition to the usual duties of the Field Officer, work in relation to Fiji disease under the Diseases in Plants Acts was performed. Growers are requested to co-operate with the Bureau staff in eradicating this insidious cane malady, and not compel drastic action by disregarding the instructions given in relation to control.

One very important matter that farmers must carry out is the eradication and destruction of diseased stools as soon as they are found, unless, for the purpose of demonstration and experiment, the pathological staff have given instructions otherwise.

THE ISIS.

At Childers work was proceeding smoothly, although intermittent showers were causing slight checks in cutting.

Varieties.

The principal canes growing are M. 1900 Seedling, D. 1135, N.G. 16, M. 55, Black Innis, and H.Q. 285. Of the newer varieties H. 109 is the best. Badila is also grown, but not extensively.

As there is an inclination on the part of some growers to make their staple varieties M. 1900 and Badila, a discussion as to the merits and demerits of these canes would not be amiss.

N.G. 15 (Badila) has been tried many times in Southern Queensland and on the whole has been found unsuccessful; being a slow grower, it has not proved satisfactory in some instances, though in other cases it has done well. It has been found susceptible to Fiji disease and gum.

Badila, however, is a very fine cane, yielding a big crop in the average growing period, with a high percentage of c.c.s.

M. 1900 Seedling is a cane that, under favourable conditions, will produce a good annual crop of high sugar content. As it is a late-maturing cane, it is absolutely essential to grow a quantity of some early-maturing variety to commence cutting upon. M. 1900 Seedling is a variety susceptible to Root Rot disease, Mosaic disease, Fiji, and Gumming disease.

Clean Fields—Farmers Commended.

There are several matters upon which the Isis growers can be congratulated, and one particularly, and that is the clean state of the farms. This is due to plenty of surface cultivation. Weeds are a curse. They injure the plant and reduce the yield in many ways. They crowd and shade the young canes, keeping away the sunshine and making them spindly. They steal food from the plants, disputing with the young crop Nature's storehouse of soil food. Weeds rob the crop of water as well as of food. They use as much—sometimes more—in proportion to their size as cultivated plants. It is in this way they inflict the greatest damage on crops.

Cultivation is the great weed-killing factor—at all events for crops that permit of interspace working, like cane. It is, however, important to know at what stage of a weed's growth it is easiest killed. The vulnerable stages of weed growth are just at sprouting and flowering time. Pasture weeds (perennial) are best killed when in flower, but the sprouting stage is the best time to tackle weeds on cultivated land. Weeds are mostly in the top inch of soil, and very little disturbing will expose the sprouting seeds and young weeds to the hot sun, when they will die. A good farmer hates weeds, but weeds, like the poor, are always with us, and we are liable to grow indifferent to both.

PIALBA.

A short time was spent in this district. Pialba is one of the healthiest cane districts in Queensland. Farmers should not, however, relax on this account, but be active with regard to plant selection and knowledge of disease, until they are 100 per cent. efficient in this respect.

Cane varieties observed making good growth are Q. 813, H.Q. 285, H. 109, H. 227, H.Q. 77, Black Innis, D. 1135, and Malagache.

Q. 813 is actually the best of these. H.Q. 77 is a cane the writer would advise the farmers to try more than they are doing. It is a heavy cane of good sugar content, though not a heavy stooler.

MARYBOROUGH.

Good crops are being cut here, although at present, in one or two varieties, particularly D. 1135, density is not high. However, taking everything into consideration, the sugar industry is gradually getting on a better footing, especially with the advent of motor lorries for haulage. The farming standard is improving, and better varieties are being grown. Farmers are recommended to plant H.Q. 285 and Q. 813 as much as possible.

There is no need to enlarge on what will happen to the crops if Fiji disease is ignored. The growers know the position, or if any are in doubt, let them visit an infected farm and note the injury.

Farmers are advised to study the art of farm road-making, as good farm roads minimise expense of transport, increase farm efficiency generally, and enhance the value of the property.

The Central Field Officer, Mr. E. H. Osborn, reports for July, 1927:—

AYR (KALAMIA AND PIONEER).

This area was inspected about the middle of July and looked remarkably well with beautifully green grass everywhere, creeks running and lagoons and waterholes carrying a splendid supply of water.

This is certainly out of the common for such a time of the year, and very old growers say that they cannot remember such ideal conditions for very many years.

Up to date the splendid total of 43.21 in. of rain has fallen—i.e., January, 16.04; February, 14.30; March, 3.45; April, 0.10; May, nil; June, 5.19; July, 4.13; total, 43.21 in., which is just about the average yearly rainfall for the Burdekin for a number of years.

It is to be hoped that this is only the first of many such seasons that will enable the Burdekin to again grow the phenomenal crops that were once so characteristic of the district.

As regards the present season's crops, they are certainly very good and show improvement since my visit here some three months ago, but one would have expected to see the cane more forward under such ideal conditions. It was pointed out, however, in my April report, that the very heavy falls in the early part of the year culminating in floods came along at a time when the cane was making splendid growth and then ceased abruptly, being followed by two practically dry months, resulting in large areas of the ground becoming absolutely caked, thus giving a decided check to the growing crops. Luckily, however, the good rains of June and July came along, saving fresh pumping operations and giving the crops a fresh lease of life.

As regards the young plant cane, in most places there has been a very good strike, the exception seemingly being in the lower lying portions (of which Kalamia has probably a larger percentage than Pioneer), more especially those that were in an extra good state of tilth.

For instance, one very thorough Jarvisfield grower gave his ground two ploughings before the very heavy rain, and as soon as possible after the downpour ploughed in a very heavy crop of grass, followed up by another two ploughings before planting. Good plants were used, but the strike was a very poor one, large quantities of "misses" having to go in.

In an adjoining block, which was only worked after the rain and which was in a poor state of cultivation, he, however, obtained an excellent strike. It seems as if heavy rain on extra well-worked soil is calculated to cause the soil to set too much. Present prospects for next year, however, indicate such a large crop that the local mills will be taxed to their utmost to handle same.

When the district was visited both mills were in full operation and doing very satisfactory work, delayed only by wet weather on a couple of occasions. Considering the rain that had fallen the density figures were exceedingly good, B. 208, H.Q. 426, and N.G. 15 being the best. E.K. 28 was also giving good returns, considering that it does its best in September and October generally; Q. 813 was also giving good returns, one sample going 16.2 being noted, whilst 99 tons of it gave an average of 15 c.c.s., with the period of supply ranging from 4th to 23rd July.

Varieties.

N.G. 15 (Badila), H.Q. 426 (Clark's Seedling), B. 208, M. 1900, E.K. 28, Q. 813, N.G. 25 (Goru), Hybrid No. 1, and Q. 903 are amongst the canes grown in the area, and each yield good returns upon suitable soils.

Badila, upon suitable soil, is one of the very best, but unfortunately in this area suffers from Top Rot in several places, otherwise it is an ideal cane, being easily the best variety to stand over.

Clark's Seedling is also a wonderfully sweet cane, very suitable for early cutting, but on many farms carries an undue proportion of dead stalks, apparently suffering from a species of Wilt or Rot.

B. 208 is a wonderfully sweet cane, too, but unfortunately is too liable to Leaf Stripe; in fact, there is so much of the disease in this variety that there is a probability of its going out of cultivation.

E.K. 28 has been planted out very extensively this year, and there is also a large acreage of it to be crushed this season. Some really splendid crops of it were noticed, and the density returns of same will be very interesting.

Q. 813 is a cane that is well worth growers' attention for poor to medium ground, for it is a splendid striker, quick grower, and hangs on to its density on suitable land practically all the season. It is also about the most free from disease of any cane. Its faults are that it is a shallow rooter, and in light sandy or grubby areas will fall down very easily.

M. 1900, for late cutting, is also a good cane.

Green Manuring.

Examples of typical Burdekin soils indicate very clearly that the above is to be highly recommended. Corn, on account of its relation to Mosaic, should not be grown anywhere near the cane paddock, therefore cowpea should be used. As mentioned in an earlier report, the Kalamia mill management have had very good results from same.

Liming, except in the very heavy, stiff soils, does not seem necessary. A top dressing of sulphate of ammonia or nitrate of soda upon ratoons in a year like the present will, however, be found to be very payable.

Diseases.

Leaf Stripe, Top Rot, and a little Mosaic are the chief diseases in this area. As for the first it is chiefly confined to B. 208, and shows up far more in the ratoons than in the plant cane. This year's crop contains a fair proportion of the above cane, and in most farms where the cane is growing, from a few to a large number of diseased stools can be seen. Control measures are digging out and burning affected stools, ploughing out and planting with a resistant variety, otherwise B. 208, as a cane variety, is liable to go out. Some years ago a large quantity of this variety was grown upon the Herbert River, but Leaf Stripe and Mosaic became so bad that it finally went out of cultivation.

Top Rot is mainly confined to Badila, although a certain proportion was noticed in B. 208 and M. 1900 in the early part of the season.

Mosaic in Clark's Seedling was noted at Airedale and Jarvisfield. In every case the disease was pointed out to the farmers, and they promised to eradicate the stools.

Red Rot in Clark's Seedling was also seen upon a Macdesme farm.

Grubs and White Ants seem to be the chief cane pests upon the Ayr side of the river, but luckily are confined to isolated areas.

The Northern Field Assistant, Mr. A. P. Gibson, reports for the month of July.

CAIRNS.

During July not much rain fell; the weather was warm at the beginning but decidedly cold at the end of the month.

The total rainfall for the year up to the end of July was 83.03 in.

The crop had improved little in growth since my last inspection—generally, it was very backward, rather low shaped, and below early estimates. Climatic conditions largely influence the production of cane and its sugar content. The crop's backward nature may be attributed to the February disaster, which occasioned severe damage to the root and top system. Grubs in no small degree had seriously retarded the growth in many canefields. It is earnestly hoped that the plant cane will weigh better than the ratoon so far harvested.

Varieties.

The principal variety grown at Freshwater is N.G. 15 (Badila); much of this kind was seriously damaged by water, the non-functioning of the top causing heavy stem shooting. Hambledon, Waree, and Sawmill Pocket grow principally D. 1135, H.Q. 426, N.G. 15 (Badila), 7 R. 428 (Pompey), and a very little H.Q. 458; this variety permits heavy weed growth, and is not desired because of the harbourage offered to pests and fungi, and to the spreading of weeds.

Harvesting and Grinding.

The weather has been ideal for this work. The covered areas are being bared with amazing speed due to crop lightness. The quality of the cane at the beginning was lower than usual. A common complaint is light cane trucks. The company make allowances for damaged flood cane, but will not tolerate trashy cane; that containing over much leaf is promptly returned to the harvesters for cleaning. Patches of cane were accidentally fired by passing locomotives. At the present moment it is thought the early crop estimate will not be reached.

Cultivation.

This part of the business is worthy of more consideration. Some fields have been ratooned when they should have been ploughed out. Ratooning should be performed as soon after trash burning as practicable; if delayed, serious consequences may follow. Harvested fields are sometimes cross-harrowed by discs prior to ratooning; this is to be highly recommended, especially in poorly harvested fields. Tractors big and small are going their hardest, and are indispensable in our days for the general advancement of all classes of field work. Recently harvested fields are being prepared for immediate planting. This is the time when surface soil tilling of interspaces is of much value; it controls weeds, conserves moisture, promotes growth, and in every way benefits the present and subsequent crops. Neglected headlands are a danger to clean fields. Home-made weeders were doing good work. It should be understood that as much as possible of the plant foods of a crop raised in a field should be returned to it, if not the soil from whence it was taken is so much the poorer.

Planting.

Planting is in progress. Some fields have been well tilled, others have not. The thorough preparation of the soil, coupled with judicious plant selection, has a powerful influence on subsequent crops; the intelligent farmer understands the great value of such a wise procedure. Edmonton forest land is costing some £40 per acre to clear and plant. Old orchards at Freshwater are gradually being cleaned up and planted to cane. Too much soil over plants is a common error; following lighter implements have the great tendency of adding still more covering.

Manure.

The soil must be moist enough to admit of manure being readily dissolved and conveyed to the roots. Different fertilizers at different rates are being added to the plant and ratoons. Offal from nearby slaughter-houses is being spread over some of the poorer fields. Molasses should be a good soil improver. An adjacent Hambledon mill red soil farm had received some 25 tons filter press cake per acre and much mill refuse water. Over 40 tons of N.G. 15 per acre was being harvested. The foliage coloration was fine.

Pests.

Grubs and Big Moth Borer are killing more shoots than usual. Midrib Borer frequently occasions dead stripes in leaves. Army Worms, Leaf Hoppers, and Linear Bugs plentifully found.

Diseases.

To prevent the ever spreading of these we must endeavour to eradicate the source of infection. If our farmers would co-operate more the annual losses would be lessened. The good achieved by some is being undone by others. Leaf Scald very prevalent in Badila in parts. Leaf Stripe was also seen on three farms at Sawmill Pocket. It is gratifying to note the energy displayed by the farmers that have this. The varieties affected are Pompey and D. 1135. Top Rot less severe now. Spindle Top and much leaf rust noted.

MULGRAVE.

Harvesting and grinding is proceeding smoothly. The big factory continues to do splendid work, and it has made satisfactory progress with its new crop. To the present moment little time had been lost. Some 30,000 tons has been milled. The mill average sugar content is now over 13.5 per cent. and steadily rising. More double-tiered cane than usual is coming forward for treatment. Some short, heavily soiled, poor-looking cane is being harvested on the severely inundated river flats. The under stem shoots on the fallen canes had perished; the upper ones had grown vigorously and are now showing some foot of cane; these shoots are existing on the stems and are considerably reducing its sugar content.

Weevil and the big Moth Borers were very active in such places. The crop appearance had improved much during the last nine weeks. Wintry conditions should have a beneficial effect so far as its quality is concerned. Brown patches among the green indicated the grubby spots. The early crop forecast of about 160,000 tons still is unchanged.

Gumming disease still at Aloomba. The writer had little difficulty in finding this. Gum oozed freely from the cut cane ends of the variety H. 109 growing adjacent to the southern banks of the Mulgrave River on two farms. Mosaic disease was abundantly noted in the same variety.

Filter Press Cane.

The value of this was clearly indicated on a Highleigh farm. About a chain of poor soil extending right along a big block had received a good dressing; the cane had not arrowed and was outstanding in colour and growth.

A good preparatory tractor-drawn implement (Australian made) was seen at work on a Highleigh farm (known as "The One Way Disc"). It contains eight discs, and when operating divide finely the old stubble and just goes deep enough to plough same out. The resulting work is improved by passing a disc harrow over it.

LITTLE MULGRAVE.

The picturesque fertile Upper Little Mulgrave River Valley has produced another good crop in spite of the severe flooding in parts. The coloration of the cane was especially green where it had been submerged, thus proving the immense value of water-borne soil transported at time of flooding. Leaf Scald and Brown Rot noted. Stools having the latter complaint simply die right out, and the ground end of stems, if opened, will be found to be of a brown pithy mass. The writer thinks it is a fungus passed over from wood to cane; so far as is known, found only in new scrub lands. Floods do good as well as harm. Last year the crop here was greatly damaged by rats. So far little injury has been occasioned by them; it would therefore appear that the flood had swept the pest away. Last year this area yielded some 15,000 tons; 1927 it is forecasted to produce about 13,000 tons.

BABINDA.

Rainfall to 23rd July over 5 in.; for year to same date, 139 in. A sunny patch followed the long dreary wet; this was generally welcomed. Overmuch rain at the beginning was prejudicial to the harvesting. The factory is now grinding continuously and well. The ever-rising mill average c.c.s. has reached 13.5 per cent. Forty thousand tons of cane had passed between the rollers, and another 150,000 remained to be milled. Approximately 11 per cent. of the total cane harvested is being burnt by permission prior to harvesting.

The Crop.

The crop is again satisfactory. Shabby patches were noted among the good. The cane possessed a healthy colour, but did not appear to be making its usual headway; the shortened period of cultivation obviously had an ill effect on its season growth. Grubs ravage decidedly less this year. The fields are cutting out quite up to early expectations. Lighter cane trucks may be attributed to crooked nature of cane rather than light cane.

It is customary to burn all trash as soon after harvesting as possible. Prevailing wet conditions have been responsible for most unsatisfactory burns. This rubbish is a breeding ground for some of our dreaded pests and hinders the necessary interspace cultivation, therefore it is highly recommended, where possible, to horse-rake this into lines and burn when favourable. The rotary cultivator is popular and doing good work, but is considered costly.

Early plant cane had germinated favourably and is making good growth, but the ground surface appeared hard in places. Farmers are preparing more land for planting; others are planting. It is not advisable to plant the following:—

(1) Severe grub-eaten cane; this is lacking in vitality.

(2) Borer-tunnelled or badly rat-eaten cane. The former may spread the pest to clean fields; the injury caused by the latter serves as an easy inlet for either pests of fungi and frequently is responsible for unsightly misses.

Old stumpy land is being cleared with the help of explosives, costing all the way from £7 to £15 per acre.

Birds.

Encourage bird life at all times on the farm; they are of untold value in keeping down pests. The good old Ibis, especially the black variety, is abundantly seen at present on the farms; the white kind is more shy and prefers sporting round the swamps.

Pests and Diseases.

Grubs and Weevil Borer are damaging cane severely in parts. Cocoons of the tachinid fly, its valued parasite, and the fly itself were found at Bucklands and nearby Babinda farms. The recommendation to leave small patches of cane to standover was urged.

Leaf Scald severe in the Goru family of cane, H.Q. 426, and to a lesser extent in Badila. Spindle Top responsible for great all-round losses in Badila No. 1 Division.

Wireless Plants.

Since the recent blow many wireless plants have been installed in the various sugar areas.

THE COTTON INDUSTRY—TAKING STOCK.

In view of the approach of the coming cotton planting season the Acting Premier and Minister for Agriculture and Stock, Mr. Forgan Smith, informed the Press recently that it was desirable to take stock of the present situation in the light of last year's experience. The prospects ahead of the cotton industry were at the present time bright, and such as to afford encouragement to cotton growers to increase their area. In 1926, during the planting season, there was a slump in the world values of cotton, the price of American middling on the Liverpool market dropping from 10d. to 6¾d. per lb. Further, at that time the question of a bounty on cotton was uncertain, and no definite understanding had been arrived at with regard to the ginning of cotton and the sale of seed. As a result uncertainty existed among all interested in the industry, and the consequence was a small planting. Some growers went in for dairying and others planted broom millet.

Since then the whole situation has changed for the better, The Queensland Cotton Board, operating under marketing organisation legislation initiated by the Government, has been successful in improving marketing conditions generally. Acting on behalf of growers satisfactory arrangements have been made for the ginning of cotton and for the sale of seed, and these have resulted in many economies. Owing to the establishment of cotton manufacturing industries in Australia the whole of the 1927 cotton crop has been marketed within the Commonwealth at prices based on import parity; this means a substantial improvement in the price which is being realised by growers on what they would have received if it had been necessary to export the cotton and accept world parity. The Commonwealth bounty of 1½d. per lb. of seed cotton has been definitely fixed for a term of years ahead.

The 1927 cotton crop has, generally speaking, been of high quality, the bulk of it having been classified in the long staple grades for which there is the best demand at the most favourable prices. If this quality is maintaned there is every prospect of marketing in Australia in 1928 at an Australian price a crop of double the quantity produced in 1927. The world price of cotton has made a recovery and now stands at a higher level than was in prospect during the last planting season.

Advice has been received from the Cotton Board that the demand for seed for the coming planting is very satisfactory. Large areas of land throughout Queensland are favourable for the production of cotton, and those with the knowledge of the industry considered that the time is now opportune for growers located in areas suitable to the production of the crop to immediately and seriously consider the question of taking up such production. It is desirable to emphasise, however, that for the successful production of cotton, the land should be thoroughly prepared and well looked after during growing operations. Haphazard and inefficient methods of cultivation are bound to bring about disappointing results. The Department's officers are available at all times to advise intending growers, and in the meantime it is hoped that every opportunity will be taken by farmers to avail themselves of the favourable prospects at present existing in this promising industry.

SOME NOTES ON CUTWORMS IN COTTON.

BY E. BALLARD, B.A., F.E.S. (late Commonwealth Cotton Entomologist).

The opening of the cotton season 1926-27 was marked by widespread attacks of cutworms, *Euxoa radians* Guer., which damaged not only cotton but other crops as well, and considerable loss was occasioned. Many cotton farmers lost their entire planting, and this loss was aggravated by the fact that no further planting rain fell until the middle of December, a date which, over most of the cotton-growing areas, is too late for bringing a full crop to maturity.

So far as the limited staff allowed, demonstrations were given to farmers in the various cotton districts of the use of the Paris green and bran baits for poisoning the cutworms, and before the attack developed notices appeared in the Press warning cotton-growers of the possibility of cutworms appearing.

A very severe infestation took place at the Cotton Research Station at Biloela, in the Callide Valley, and in consequence it was possible to make some observations on the nature of the attack which seemed of sufficient general interest to farmers to warrant their publication as, so far as the writer has been able to discover, they have not before appeared in print.

Observations of cutworm infestation have not been carried on for sufficiently long a time for one to be able to say whether these pests are to be expected every spring, as is the case with the corn earworm, or whether they will only occur in certain years. For the present it would be safer for all cotton farmers to regard cutworms as annually occurring enemies and to take the necessary precautions to render their assaults harmless.

The history of the cutworm invasion at the Cotton Research Station is as follows:—

Cotton was sown in the last week of September and the first week of October and damage to the cotyledons or first leaves was first noticed on 13th October. This damage was in some places very severe, the leaves being entirely devoured. Five acres of cotton was entirely destroyed or so badly damaged that the surviving plants were ploughed out.

Baiting was resorted to, and dusting with calcium arsenate, and by 21st October the attack had died down and was over by 25th October. There was a recrudescence in November which was immediately checked by means of the Paris green bait, and since then there has been no further trouble.

The peculiar feature of this outbreak and where it differed from others which have been investigated was that the worst damage was done by very young cutworms, for which the bait appeared to be too tough. These young caterpillars, instead of being one or two to a plant as is usual with the older ones, fed in masses and in a single night played great havoc, some feeding on the cotyledons almost as soon as they unfolded above ground.

Generally the most destruction is done by cutworms which are half grown and it appears to be rare for smaller ones to be found feeding on the cotton seedlings.

So long as cutworms were available in sufficient quantities, constant observations were carried on both in the field and in the laboratory, and as a result of these certain conclusions were arrived at which are as follows:—

Moths first emerge during September and before eggs are laid certain conditions have to be fulfilled. These appear to be the presence of cover such as that provided by low spreading plants like bull head (*Tribulis terrestris*) or pigweed (*Portulacca*).

The soil in which eggs are to be laid must be moist but not wet, and the bull head or pigweed must be in such a state of growth that it acts as a mulch, keeping the soil moist during the hatching period.

Egg laying invariably took place after one of the light showers experienced in November, and always and only in places where the conditions of moisture obtained which have been outlined above. Bull head which has become straggly and ceased to provide shelter was never chosen, while thick matted bull head nearly always yielded a find of eggs or young caterpillars.

So long as there is a plentiful supply of bull head the younger stages of the cutworm do not scatter but remain feeding on the leaves of the bull head. It appears to be only the half-grown caterpillars which wander from the place where they hatched in ever-widening circles.

At Biloela when the cutworms first appeared there was very little bull head or pigweed growing owing to the prolonged dry weather, and this probably accounts for the fact that the young cutworms attacked the cotton in the way they did.

Another very important conclusion which the evidence seemed to warrant was that eggs are never laid on or under the cotton plant, and that in a clean field all damage done by cutworms would be from invasions from headlands or from neighbouring unweeded paddocks.

If forced to do so by special and peculiar circumstances, a moth will lay in situations other than those described, but this is rare and normally eggs are laid in moist soil and under cover.

An interesting example of a forced laying was found where a moth had laid her eggs in the web of a Red-back spider (*Latrodectus hasseltii* Thor.).

Cutworm eggs will not survive the action of direct sunlight and layings made under bull head, when exposed to the sun, shrivelled up.

Bull head appears to be the favourite plant under which to lay, and the eggs are often lightly covered with soil and are sometimes difficult to find. Pigweed is also used but not so commonly as bull head.

Eggs have been found under *Euphorbia drummondi,* but the cutworms would not eat it.

The soil conditions under this plant were ideal from a cutworm's point of view, and this probably enticed the moth to lay there. It is very unusual to find dead moths lying under bull head amongst the eggs. Of the numerous plants examined only these had eggs laid under them.

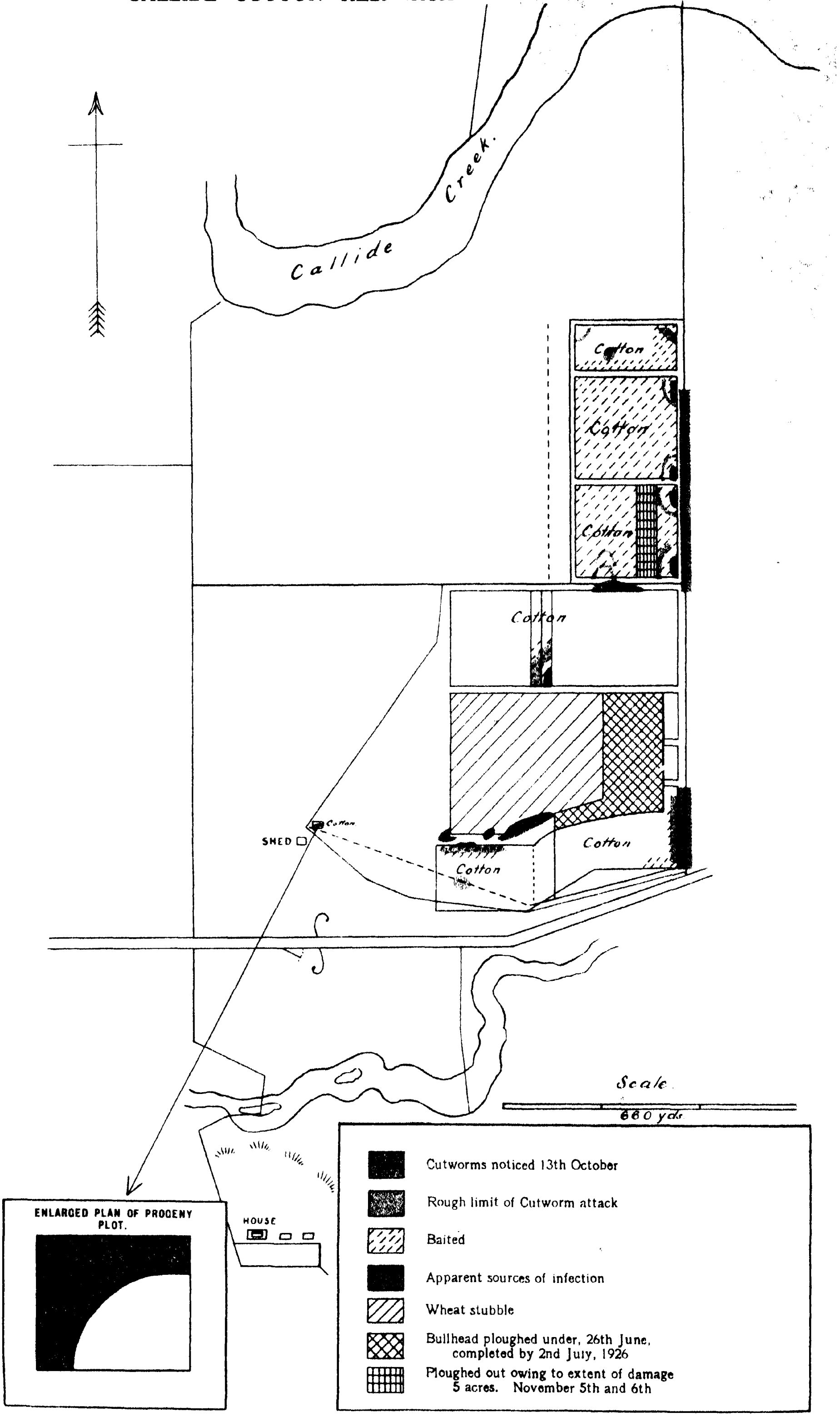
Natural enemies of the cutworms soon get to work and a second serious attack after the first outburst seems rare, although caterpillars can be found on headlands and weedy paddocks through the summer.

For next season the proposal is to work along the following lines:—

(1) Bearing in mind the marked preference shown for bull head and pigweed, to keep all fallows as clean as possible.

(2) To plough a steep-sided furrow along headlands, to catch invading cutworms after the crop is planted.

CALLIDE COTTON RESEARCH STATION, BILOELA.


Callide Creek.
Cotton
Cotton
Cotton
Cotton
Cotton
Cotton
SHED
Cotton
Scale.
660 yds.
ENLARGED PLAN OF PROGENY PLOT.
HOUSE
Cutworms noticed 13th October
Rough limit of Cutworm attack
Baited
Apparent sources of infection
Wheat stubble
Bullhead ploughed under, 26th June, completed by 2nd July, 1926
Ploughed out owing to extent of damage 5 acres. November 5th and 6th

(3) This furrow might be baited with Paris green and bran or pollard. (Half to full grown cutworms will readily eat bait which is quite dry and which has been lying in the field for some ten days.)

(4) If an invasion does take place it will only be necessary to put bait in front of the advancing cutworms, and not to cover the whole field.

When baiting, little heaps should be put by the stem of each plant so that the cutworms must find them on their way to feed at night.

Dusting very young plants with calcium arsenate appears to be useless as their leaves will not hold the dust as they do when they are older.

The accompanying map shows the cultivation at Biloela and the cutworm invasions. This is very typical of other farms examined in the vicinity.

To recapitulate: Provided that the paddocks are clean cutworm attack will only come from weeds on the headlands, and the favourite food plants are bull head and pigweed. Attacks may generally be expected in October and perhaps early in November. One or two cases of cutworms damaging crops were reported in January.

After the first emergence of moths and the subsequent egg laying, the natural enemies of the cutworm get to work and soon make themselves felt. These enemies include so far as we have found this season:—

(1) An egg parasite. This was abundant in December.

(2) A small Braconid wasp which parasitized the half-grown caterpillars. This was rather rare in the Callide, but very common on cutworms collected at Gatton.

(3) A Tachinid fly, also a parasite of the caterpillars but not very common.

(4) A predatory wasp. This wasp was present at Biloela in very large numbers and collecting cutworms steadily during November, December, and January, although it was not so common during the latter month. None of these parasites has yet been identified.

(5) The onset of rain and high atmospheric humidity in the middle of December made it very difficult to rear cutworms in the laboratory, whatever precautions were taken to keep them dry. It is possible that excessive moisture has the same adverse effect on them as it does on corn earworm, the symptoms shown by the dead caterpillars being very similar.

In the summer months the life of the cutworm occupies just about seven weeks from egg to moth, thirty days being passed as a caterpillar. The stages which do the most damage appear to be during the last fifteen days—i.e., from stage three onwards.

It is not yet known how long the hibernation period is nor when it begins, nor the temperatures which would induce it. It seems probable that, after a mild winter like 1926, cutworm attack could be expected earlier than after a severe winter when the soil was colder and would take longer to heat up to the temperature necessary to induce moths to emerge.

During the last cutworm outbreak, an interesting observation was made when it was found that a plot of ratoon cotton was attacked and very badly damaged before the cutworms moved on to the plant cotton.

This is worth recording as it has been stated that ratoon cotton is not attacked.

The younger that plants are when the cutworms begin to eat them, naturally the more serious is the result, but more advanced plants do not feel the loss of the leaf nearly so much.

At Biloela in November it was known that cutworms were present in one block as the predatory wasps were hunting there all day and in large numbers, but the damage was nowhere appreciable. Fortunately it is rare for *Euxoa radians* to girdle the young cotton plants, although it does sometimes happen. This habit is far more serious than that of eating the leaves, and is common with other species. The problem before the cotton farmer seems to be to keep his fallows clean and also the growing crop so that moths are not tempted into the fields to lay, and to protect the young plants from invasions from headlands or neighbouring paddocks.

So long as moths can be prevented from laying their eggs in the cotton fields when the expense of widespread baiting would be involved, it is a comparatively simple business to check an invasion from the headlands, as only a small part of the field would have to be baited. The two most dangerous weeds are bull head and pigweed.

The bait formula has often been given, but is repeated here:—Bran or pollard, 25 lb.; Paris green, 1 lb. Mix well together. Then add water sweetened with molasses so as to make a mash which will just crumble in the fingers. Put little heaps at the foot of each plant in the neighbourhood of the invasion and for a short distance ahead of it in the evening. Be prepared to repeat the application in a week's time. Do not wait for an attack before buying Paris green. Have it ready for instant use.

THE CUTWORM MENACE.

FARMERS PROTECT YOUR SEEDLING COTTON!

Every year some damage is done to cotton seedlings by cutworms. These cutworms are greyish-brown caterpillars about 1¼ inches long when full grown, and represent one of the four stages in the life cycle of a moth.

The cutworm moths have been observed to lay their eggs under weeds on the headlands, &c.

On hatching from these eggs the young caterpillars move into the cotton fields and eat the leaves of the seedlings.

TO AVOID TROUBLE FROM CUTWORMS THE FOLLOWING MEASURES ARE RECOMMENDED.

Plough a deep furrow round the field immediately after planting; the steep side of the furrow next to the crop.

This may frequently effectively stop the advance of the caterpillars, but if necessary sprinkle poison baits along the bottom of the furrow when the attack is actually in progress.

Keep the fallow and newly-planted fields free from weeds or centres of attack may be found *inside* the crop.

If an attack inside a field is noticed, scatter poison baits over the whole affected area and a few yards beyond.

Don't wait till the damage is done before taking action. Be on the look out **for an attack** *from the moment the seedlings come through the ground* **until they** are 6 inches high.

Poison bait formula:—

Bran	25 lb.
Paris green	1 lb.
Molasses	1 quart

Mix bran and Paris green together dry, then add molasses and water till mixture is moist and crumbly but not wet.

Warning.—Paris green is very poisonous, and must be kept away from poultry and other live stock, as well as human beings. It will not harm the skin when handling.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	July.	No. of Years' Records.	July, 1927	July, 1926.
North Coast.	In.		In.	In.
Atherton	0·90	26	2·16	0
Cairns	1·57	48	2·02	0 27
Cardwell	1·39	53	2·04	0·63
Cooktown	1 00	51	1·20	0·50
Herberton	0·72	40	1·85	0·26
Ingham	1·52	35	3·10	0·67
Innisfail	4·67	46	6·76	2·69
Mossman	1·42	14	1·48	0·10
Townsville	0·56	56	5·26	0·19
Central Coast.				
Ayr	0 65	40	4·13	0
Bowen	0 93	56	2·49	0
Charters Towers ..	0·62	45	2·63	0·17
Mackay	1·67	56	3·29	0·13
Proserpine	1·30	24	3·61	0·24
St. Lawrence ...	1·28	56	3·38	0·06
South Coast.				
Biggenden	1·42	28	0·70	0·55
Bundaberg	1·89	44	1·06	0·18
Brisbane	2·28	76	0·52	0·85
Caboolture	2·27	40	0·52	0·57
Childers	1·77	32	1·43	0 92
Crohamhurst ...	2·97	35	0·47	1·00
Esk	2·02	40	0·80	0·60
Gayndah	1·49	56	0·99	0 34
Gympie	2·21	57	0·46	1·05
Kilkivan	1·79	48	0·63	0·20
Maryborough ...	1·94	55	0·81	0·99
South Coast— continued:	In.		In.	In
Nambour	2·92	31	0·30	1·34
Nanango	1 74	45	0·55	1·02
Rockhampton ...	1·46	40	2·27	0·26
Woodford	2 48	40	0·49	0·13
Darling Downs.				
Dalby	1·77	57	0·41	0·64
Emu Vale	1·58	31	0·84	1 23
Jimbour	1·62	39	0·27	0 38
Miles	1·69	42	0·07	0·30
Stanthorpe ...	2·07	54	0 10	1·65
Toowoomba ...	2·08	55	0·52	0 89
Warwick	1·84	62	0·46	0·92
Maranoa.				
Roma	1·49	53	0·16	0·18
State Farms, &c.				
Bungeworgorai ...	1·73	12	0·10	0·12
Gatton College ...	1·45	27	0·14	0·36
Gindie	1·04	27	0·11	0
Hermitage ...	1·81	20	0·76	0 98
Kairi	1·25	12	1·54	0·36
Sugar Experiment Station, Mackay	1·50	29	3·07	0 07
Warren	1·27	12	1·05	0·13

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July, 1927, and for the same period of 1926, having been compiled rom telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

PLATE 60.—AT THE INAUGURAL CEREMONY.

The Show was opened officially by Lord Stonehaven, Governor-General of Australia, on 10th August.

From left to right: ——, Sir John Goodwin (Governor of Queensland), Hon. W. Forgan Smith (Acting Premier of Queensland), Mrs. W. Forgan Smith, Mrs. S. M. Bruce, the Right Hon. S. M. Bruce (Prime Minister of the Commonwealth), Lady Stonehaven, Lord Stonehaven, Lady Goodwin, Mr. Ernest Baynes (President of the Royal National Association).

ROYAL NATIONAL EXHIBITION.

QUEENSLAND'S GREAT ANNUAL AGRICULTURAL EVENT—THE FRUITS OF FARM AND FIELD, OF SOIL AND TOIL, GIVE EVIDENCE OF THE ATTAINMENT OF HIGH STANDARDS OF HUSBANDRY—THE ALLIANCE OF THE SCIENTIST AND THE FARMER—THE STATE'S GREAT ADVANCE IN RURAL AND COMPLEMENTARY URBAN INDUSTRY MADE MANIFEST—ANOTHER SUCCESS ADDED TO THE LONG RECORD OF THE ROYAL NATIONAL ASSOCIATION.

This year's Brisbane Show, held on 8th August and following days, was a revelation of the enormous natural wealth of Queensland and her extraordinary productive capacity, even in a year of unusual dryness.

The inter-dependence of rural and urban industry; the intricacies of commerce as applied to primary production; the principles and practice of modern farming; animal husbandry in all its branches; the mechanisation of agriculture; the extent of Queensland's rural wealth were all typified, represented, or demonstrated.

In huge daily crowds, prosperous-looking and orderly, were reflected the general happy social conditions ruling in the Queen State of the Commonwealth.

A week of brilliant weather completed the success of the Exhibition which, from every point of view, was equal to the high standards set by the National Association in previous years.

BRIGHT days and cloudless skies, with just that suggestion of wintry keenness that makes the mid-year months in Queensland so delightful, was Nature's generous contribution to the success of this year's Exhibition. The Show was opened officially by the Governor-General of Australia, Lord Stonehaven, on 10th August, in the presence of a large crowd, which included many notable visitors from the Southern States.

The Court of the Department of Agriculture and Stock; the pine forest in miniature of the State Forestry Service; the comprehensive district exhibits; the "one-man farm" exhibits, each in itself a microcosm of a country show; the competitive entries in the agricultural produce section; and the Rural Schools' display were the outstanding pavilion features. Out in the arena were paraded representatives of fashionable Herd-book families. Coming under the critical scrutiny of some of the best stock judges in Australia, they survived the test with honours. Some of the most successful breeders from other States who were present were not slow to express their satisfaction with the quality of Queensland purebred stock in every section. Blood and draught horses, worthy representatives of their respective breeds, won public as well as judges' commendation. A remarkably fine troop of police horses bred at the Government Remount Station, of the type that has won fame for the "waler" wherever horses are spoken of—the type that proved its mettle on the long desert marches in Sinai and Palestine at the time when the Australian Light Horse, with other units of British cavalry, made history as the greatest mounted field force the world has known—was immensely popular.

A group of Clydesdale sires which have been placed by the Queensland Government at the disposal of farmers for farm horse improvement commanded equal attention, and shared in the appreciation evoked by the police remounts.

This year the spacious John Reid Hall and its associated annexes were occupied by the Chamber of Manufactures with some impressive displays of secondary products made in Queensland.

Temperate and tropical fruits, in extraordinary variety and excellence of quality, also provided evidence of the wide range of climate and richness of soil which Queensland enjoys.

In the following pages many of the exhibits are reproduced pictorially. Our photographs are the work of Mr. H. W. Mobsby, F.R.A.S., F.R.G.S., artist and photographer to the Department of Agriculture and Stock.

Included in the gathering at the opening ceremony, besides the Governor-General and Lady Stonehaven, were the Governor of Queensland, Sir John Goodwin, and Lady Goodwin; the Deputy Premier and Minister for Agriculture and Stock, Hon. W. Forgan Smith, and Mrs. Smith; the Prime Minister of the Commonwealth, the Right Hon. S. M. Bruce, and Mrs. Bruce; the President of the Royal National Association, Mr. Ernest Baynes, and Mrs. Baynes; the Under Secretary for Agriculture and Stock, Mr. E. Graham; the Assistant Under Secretary, Mr. Robert Wilson; the Director of Agriculture, Mr. H. C. Quodling; the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby; the Chief Inspector of Stock, Major A. H. Cory; the Acting Director of Fruit Culture, Mr. George Williams; the Chief Supervisor of Dairying, Mr. E. McGrath; Mr. W. A. Affleck, and the Secretary of the Royal National Association, Mr. J. Bain.

THE MEAT INDUSTRY EXHIBIT.

AN EDUCATIONAL EYE-OPENER.

The importance of the meat industry in its present condition of primary production and home consumption was brought home to everyone who had the good fortune to see the wonderfully complete exhibit in the new Meat Hall at the Exhibition Ground. The real educational eye-opener, however, was the extraordinary range of the utilisation and manufacturing sides of the industry it illustrated, and it may be fairly claimed that no one left the Meat Hall without at least some vision of pastoral possibilities in Queensland and the meat industry as a basis for widely embracing home manufactures. The interdependence of primary and secondary industry could not have been exemplified more impressively, and the exhibit had its lessons, not only for producers but to statesmen as well. As an industrial trophy it was a triumph, and all concerned in its organisation and display won warm public appreciation.

THE EXHIBIT DESCRIBED.

As the visitor entered the main door he was struck by a slogan which fittingly described all the exhibits in the building: "The outcome of scientific and industrial research which shows no signs of approaching its ultimate boundaries." On the top of this slogan there was the Australian coat of arms, the flag of our land, and the head of a bullock.

The most prominent feature was a refrigerating case, designed by Wildridge and Sinclair, Limited, to stress the importance of the application of mechanical power in refrigeration, to which the development of the live stock and meat industry in Australia has been largely due. Exhibited in a most attractive manner within the case were sections devoted to beef, mutton, and pork, and a Lightfoot (Linde) refrigerator installed by Wildridge and Sinclair, Limited, was in operation day and night.

Mutton and Beef Sections.

In the mutton section the exportable qualities were shown, and a demonstration given of the economical cutting of carcase mutton and lamb. This section was of great educational value, showing, as it did, how to secure the utmost value from the carcase and at the same time give to consumers the choicest cuts. Smallgoods, such as tongues, trotters, frys, kidneys, brains, and so on, short sirloin, cutlets, and neck chops, formed an attractive embellishment to what was unquestionably the finest mutton display that has ever been seen in Australia.

In the beef section American exhibition methods had been copied with advantage, and the cuts employed in the famous Smithfield meat markets, London, were prominently shown. A complete side of beef was displayed in a prominent position, and the cutting demonstration cleverly lined out from a bullock which, in general principles, represented a type of cattle that must be produced in Australia if we desire to maintain our export trade. In addition to the main sectional cuts of buttock, rump, loin, rib, and chuck, there was an exhibition of round rump, Porter-house, and sirloin, while the bigger joints were represented by silverside, sirloin, roast, rolled rib, standing rib, and brisket. The smallgoods subsection was also very interesting, ox tongues, brains, sweetbreads, hearts, kidneys, thick skirts, and so on being shown. It was a demonstration of the technique of cutting, and taught the lesson that producers must keep up the quality for the home and export markets.

Pork Exhibit.

There is a tremendous co-operative interest in the pork industry in Queensland, and the splendid exhibition of products from what is described in the Meat Industry Hall as ''The noble vertebrate'' was an education to all those interested in pig-raising, and the general public also learnt many things it did not know. Sides of the pig were attractively displayed in a semi-circle. A full carcase of the animal was in the centre, and the cuts—cheek, cushion, rib, chops, loin, leg of pork, and the hand and spring were shown, together with cutlets, kidneys, trotters, and so on. A humorous touch was introduced. Three porkers, reclined on a bed of grass, oblivious to the interest that visitors to the Show were taking in their slaughter. A ticket asked visitors to ''Please go away and let us sleep.''

Over the refrigerating-room, 30 feet by 8 feet, there was a striking pictorial display in cut-outs of pure breed baby beef cattle, the Hereford forming the two centre pieces, flanked on either side of the polled Angus and the Shorthorn. The artist succeeded in making these cut-outs very life-like. There was no mistaking the youth of the beasts, which represented the absolute standard of perfection of their type—the stars to which all breeders must hitch their waggons.

Meat Industry Board's Display.

Another very fine exhibit was that of the Meat Industry Board of New South Wales. The public abattoirs at Homebush Bay, Sydney, were represented by a diorama of striking beauty. The visitor was told, by attractive posters, that the Homebush Abattoirs is not a State concern. There is slaughtering and killing accommodation for all the butchering interests of Sydney, as well as facilities for supplying the killing and refrigerating needs of the New South Wales export trade. Situated within 1,600 acres of pastoral land, there is ample space for the resting of sheep and cattle. The Meat Industry Board claims that it has the largest by-product works associated with any public abattoirs in the world. One was told, further, that ''the magnitude of the by-products treated at Homebush is due to the concentration of killing.'' Many of the by-products are absolutely unprofitable in small quantities, and can only be treated economically in a works which has a daily capacity of 1,500 cattle, 20,000 sheep, 3,000 pigs, and 2,000 calves.

Using By-products.

Among the by-products which are saved at Homebush and profitably treated are the pituitary, thyroid, and other glands, which provide the manufacturing chemist with raw material for the treatment of hypertensive and prostrate diseases of the human race. Rennet for the manufacture of cheese is another by-product which is rapidly capturing the export trade, and is very much appreciated on the other side of the world. Meat concentrates for the feeding of dairy stock, poultry, pigs, and sheep are prominently featured, and the Homebush Abattoirs claim to have led the world in this part of the industry. It claims to be the only meatworks in the world which has a specialised department for this work. Casings is another important by-product, and there is a wide range of dried gut products, power gut for the transmission of power in sheep-shearing and other machines, tennis racquet gut, violin strings, surgical gut, gold beater skins, and so on. It was a unique exhibit, and the whole arrangement was quiet and dignified, a colour scheme of blue and gold predominating. Revolving spheres symbolised the importance to civilisation of the meat industry in Australia. A striking pictorial centre-piece depicted the 1926 sheep dog trials at the Royal Agricultural Show in Sydney. Particular stress was laid on the fact that the Homebush Abattoirs is not a State enterprise, but a public utility, which aims at assisting the meat industry, without disturbing the law of supply and demand or hampering initiative or free competition. Among the by-products from cattle and sheep were tallow, oils, casing, fertilizer, meat extract, olio, stearine, oleia, hair for the brush trade, and bone products of all kinds.

Trade Exhibits.

On the main background was a range of striking trade exhibits—domestic and toilet soaps, showing the process of milling and plodding soap, its cutting and pressing into tablets ready for sale; sheep and cattle leathers, in rainbow hues, indicating the many uses to which fancy leathers are put, cushions, table centres,

PLATE 61.

Top—Hacks and Ponies parading for Judgment. *Bottom*—Some of the Cattle in the Grand Stock Parade.

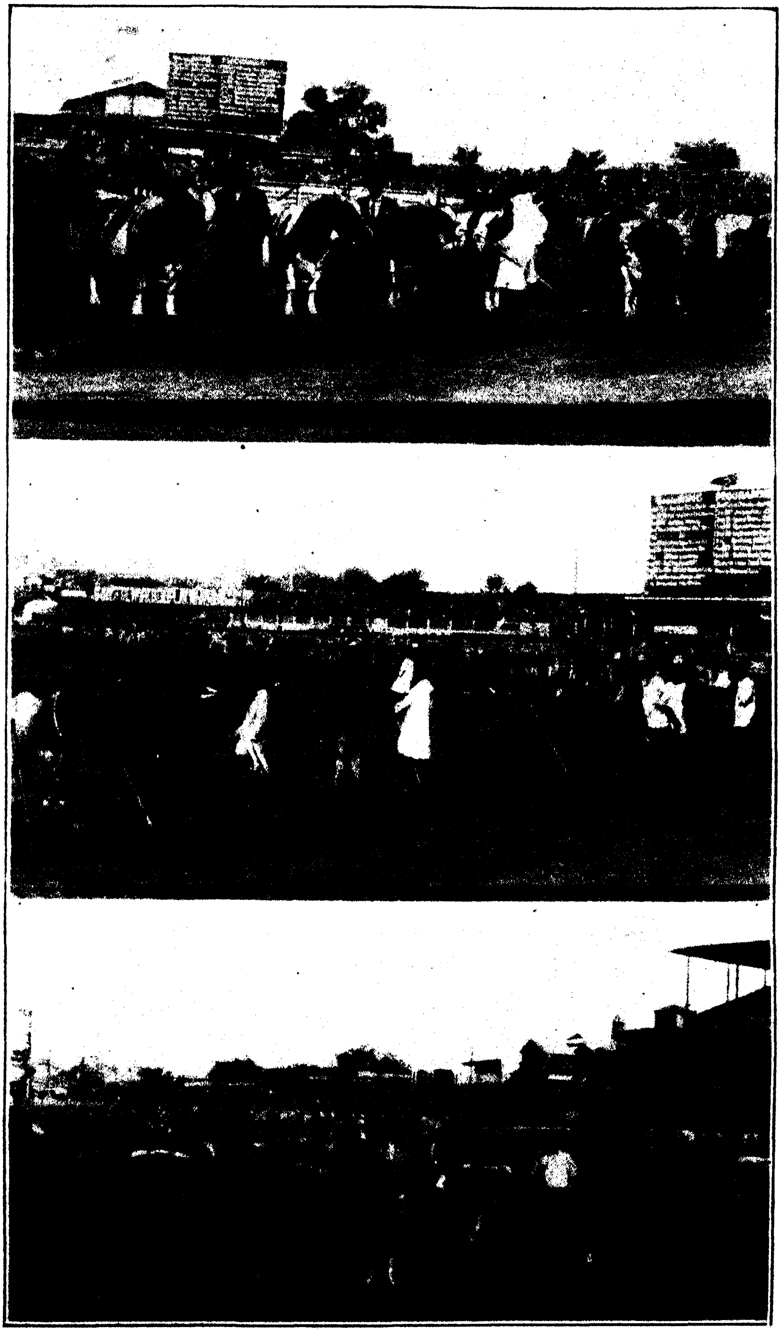


Plate 62.—Up for Judgment!

Top—Ayrshire Sires undergoing a Critical Scrutiny.
Centre—Jerseys were Strong Favourites.
Bottom—Shorthorn Aristocrats from Fashionable Families.

wallets, ladies' handbags, boots, and shoes. The woollen exhibits showed the process of manufacture from the time the wool is taken from the sheep's back until it is turned into finished suitings or flannel. The intricacies of the weaving industry were shown in a revolving pyramid of flannels, in many colours—blankets, rugs, suitings, and dress materials were displayed.

Margarine was exhibited prominently, and the visitor shown the uses to which animal oils can be put. There was a wide range of boot and shoe exhibits, showing the technique that is now employed in the manufacture of leather in Queensland. The visitor had only to examine the examples of Australian leather-wear critically to realise that the product of our factories outrivals the productions from the famous French and American factories. Canned meats were exhibited, and the process explained. Among the stock foods was an exhibit of "Kube," a new sheep food, which keeps flocks alive in drought time. On the opposite end of the hall to the refrigerating section, there was a very fine diorama of Swifts' works on the Brisbane River, with a view of the picturesque country in the distance, and a steamer lying at the wharf. In the pig industry section—the display dedicated to "the noble vertebrate"—the importance of the bacon industry was stressed in a manner that had not been attempted hitherto. All the main cuts, such as hams, middles, sides, flitches, and rolled bacon, formed the centre of a colourful display. Small goods, oils, and brawns flanked the two sides, while tinned meats were represented by tongues, camp pie, sandwich meats, and by-products of the hog house. Leathers—saddles, travelling bags, fertilizers, tallows, and crude oils, were also exhibited.

An Education—"Run Australian Industry on Australian Ball Bearings."

Of great educational value was the display showing the dependent and interwoven products of the meat trade. The diversity of the leather industry, and its close association with the live stock business, was stressed in a remarkable manner. There were beautiful examples of tan and black box yearling leathers, raw hides, yearling tan, willow calf, black willow calf, tan sole leather and chrome sole leather, belting for machinery, and laces of all kinds. A demonstration of shoemaking was given, and the tanning process was shown by actual examples of the hide in its transition from the raw material to the finished article. Glue, in association with the head and leg pieces from which it is derived, was exhibited in many forms, and several important grades of premier juice and tallow indicate the great importance of the fat and oil of bovine stock. Another interesting feature showed how the hoofs of cattle are decolourated and Prussian blue is obtained in the process, this colour being the base of our common washing blue. From the hoofs, buttons, combs, shaving brushes, and scores of other articles are obtained. On the opposite side of the centre-piece was an attractive soap exhibit, and gelatine, which was made from the sinews, and medicinal products derived from glands were also shown. Among the bone products were combs, knives, forks, spoons, shaving brushes, tooth brushes, knife handles, and the like, and the use to which bone is put in the hardening of steel was also stressed. The bone is subjected to terrific heat in order to give a deep carbon penetration, which makes possible the use of ball bearings in high speed machinery. Associated with this section was a slogan: "Run Australian industries on Australian ball bearings."

Sheep Industry.

The sheep industry was represented by a woollen centre piece, in which there was a fleece from the famous Glengallan Station, taken from sheep imported into Australia by the late J. B. Bettington, of Hunting Park, New South Wales, in 1842. Around it were the drawings, twistings, robings, and spinnings of the worsted process. Sheep leathers in many forms were also displayed, as well as glue, soap, gelatine, tallow, mutton, stearine, and medicinal products from the thyroid gland, lanoline and products, oil, glycerine, animal foods made from kibbled bone meal, meat meal, boveraline, ovavita, bone licks, and soap. There was an interesting display of Japanese soap made from Australian tallow. The packing is a close imitation of European methods. Boxing gloves, cricket pads, wicket-keeper's gloves, tennis racquets, gold club grips, and hundreds of other articles show how wonderfully science has helped industry, and how many useful articles are made from by-products which, not many years ago, were thrown away as useless.

Three Important Points Strongly Impressed.

This magnificent display of subsidiary meat industries impressed forcibly on the mind of the visitor three points:—**They provide a better price for cattle on the hoof; they lower the price of meat to the consumer, because, if they were not availed of, the revenue derived from them would have to be obtained directly from the consumer of edible meats; and their manufacture is playing no small part in making Australia a self-contained nation.**

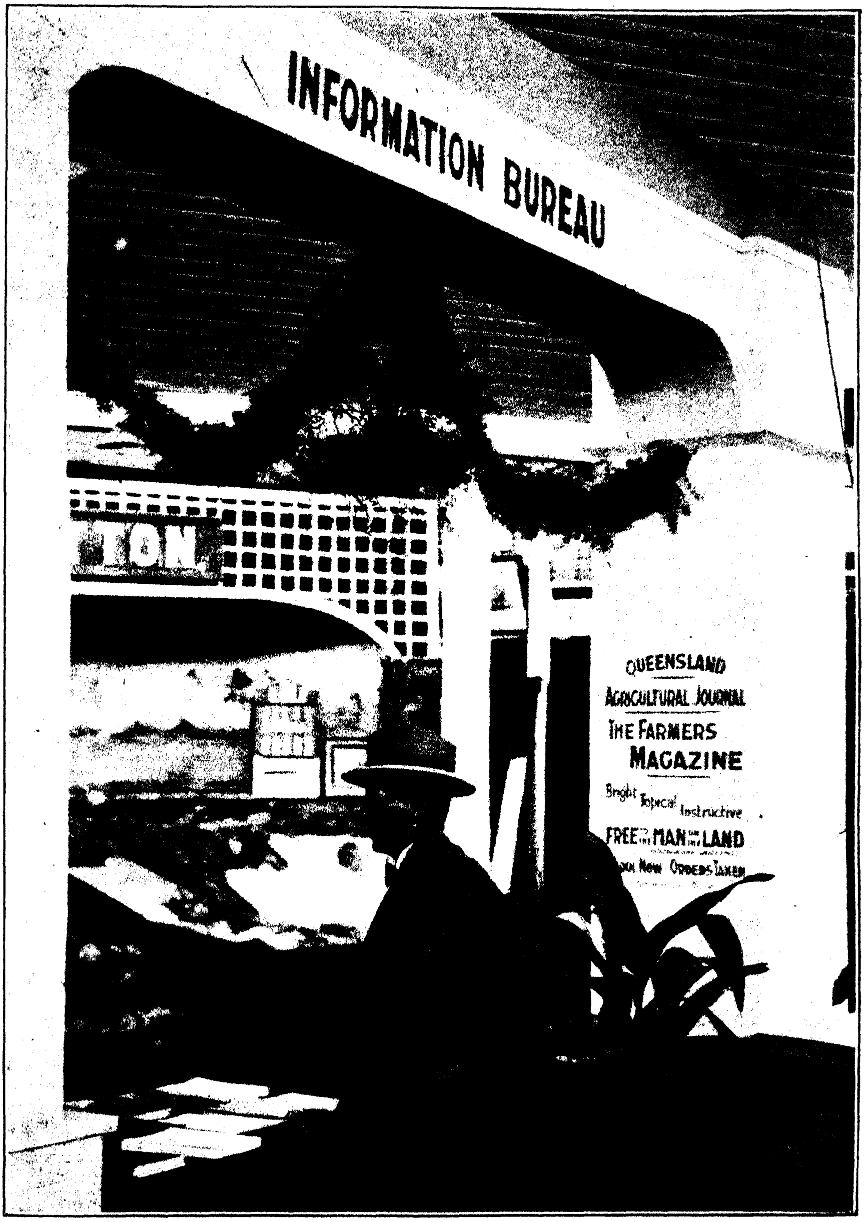


PLATE 63.—THE "JOURNAL" ALCOVE.

A useful innovation in the Court of the Department of Agriculture. In the course of the Show the Bureau, in charge of Mr. Wilkie Lewis, became a recognised clearing house for Departmental information

THE AGRICULTURAL COURT.

REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

The Department of Agriculture and Stock again presented its annual display of primary products—tropical, sub-tropical, and temperate—together with striking examples of the work and progress of its highly trained and skilled scientific and technical services. Its agricultural extension efforts and effective publicity agencies were also fitly illustrated. In fact, the Departmental Court was really the Department itself in miniature, and even the most casual observer must have been impressed with the vast importance to the State of its wide-spread administrative and instructive activities.

Several sub-departmental sections contained excellent examples of the close attention bestowed on field and laboratory problems by departmental officers, and these included illustrations of the results of scientific research and field effort associated with Wool, Queensland Natural Grasses, Sugar, Wheat Breeding and Cultivation, Maize, Cotton, Dairying, Pig Raising, Poultry Farming, Power Alcohol Production, Broom Millet, Peanuts, and other crops, Entomology, Plant Pathology, and Publicity.

All these were arranged in practical order, and the wealth of Queensland soils and pastures was appropriately symbolised in striking trophies of artistic design, and set within the quadrangle in such a way as to compel attention and evoke admiration.

The colour scheme of the Court this year was a vellum tint and grey relieved with gold. Between each trophy were columns in stone supporting arches with light asparagus festooning. Palms and ferns added to the beauty of the decorative design. The experience gained at many international exhibitions, including Wembley and more recently the South Seas Exhibition at Dunedin, as Queensland representative, by the designer and display officer of the Court, Mr. H. W. Mobsby, F.R.A.S., F.R.G.S., was evident in the tout ensemble. He had to visualise the whole lay-out and design the floor plan and elevations of each setting for the display of products. His aim has been to make the Court each year, if possible, better than the last and thoroughly representative of the advance in Queensland agriculture in which the Department, under the direction of the Minister, Mr. W. Forgan Smith, takes a strong lead. The Department of Agriculture and Stock has now become one of the most important administrative and directional services in the State.

A new court feature this year was an Information Bureau, representing the Publicity Section and the "Queensland Agricultural Journal," at which was in attendance an officer who arranged interviews between visiting farmers and departmental specialists, and attended generally to the wants of the inquiring public.

CEREAL CROPS—EVOLVING NEW TYPES.

Maize.

The central feature at the Court of the Department of Agriculture and Stock was devoted to Queensland's principal cereal, maize. On this trophy was seen possibly the most comprehensive display of the kind ever shown at the Royal National. The quality, type, and uniformity of the grain afforded a striking example of what has been accomplished by the departmental maize specialist (Mr. C. J. McKeon) by scientific seed selection, a reflection of which was seen in the splendid exhibits of maize in the competitive sections at the Show. Each exhibit on the trophy was accompanied by descriptive labels setting out the fundamental principles of seed selection, which the grower can readily follow. Added interest was afforded by the knowledge that the Department makes a practice of supplying pure seed of these varieties to growers. One of the most significant exhibits illustrative of the valuable work accomplished by the maize specialist was the new variety, Durum maize, specially bred to meet the exigencies of the climate on the Atherton Tableland. In this locality one of the principal difficulties is to produce grain resistant to a form of mould (Diplodia), and of sufficient hardness and good keeping quality. So far the new strain has maintained the characteristic hardness of one of its parents, flint corn, and was exceptionally free this season (a reputably wet one) from Diplodia. A seed maize improvement scheme is being conducted by the Department on the forest country in the Atherton district with the object of propagating supplies of seed for local distribution from next year's crop.

Wheat Breeding.

This display dealt specifically with varieties of wheat bred at the Roma State Farm by the manager and wheat breeder, Mr. R. E. Soutter; also with other varieties from the Southern wheat-growing States, which have proved suitable for general cultivation in Queensland. Centrally disposed on the exhibit was a chart of a wheat classification scheme prepared by officers of the Field Branch, which set out varieties recommended for planting in different districts; their period of development—early, medium early, mid-season, and late maturing; the correct period of planting; the soils that individual varieties are most suited for; and the texture of the grain of each kind of wheat. The chart in reality is a guide to growers. The important work of breeding varieties to suit Queensland conditions has been carried out by the Department for upwards of twenty years, and good work has been accomplished. Sixty per cent. of the wheats enumerated on the chart are departmental varieties.

Pure Seed.

Officers of the Field Branch are closely associated with the testing each season of a large number of new strains bred at Roma, which are tried out under different environment in a number of districts where their resistance to rust and field characteristics are made the subject of close observation. To conform to the standard required, "crossbreds" are tested from year to year, to gradually eliminate the unfit. Closely associated with this work is a scheme for the propagation of supplies of pure seed under an arrangement made between the Department and the Wheat Board, which pays a premium to growers who co-operate and undertake to deliver a proportion of their crop to the Board. In this way the purity and type of approved varieties are maintained, and supplies of clean and graded seed are thus available for further distribution, by which latter arrangement the more dependable kinds are gradually brought into cultivation. One very promising strain—combination of Cretan, Bunge, and Gluyas, which has stood out prominently in the field tests and is also resistant to rust—has been put into cultivation this season, and named "Duke of York," to synchronise with and to commemorate the date of the Duke's visit to Queensland.

OTHER PRODUCTS.

Northern-Grown English Potatoes.

The northern parts of the State are largely dependent on Southern-grown potatoes which are periodically shipped to suitable ports. An effort has been made by the Department, through its Northern Instructor in Agriculture, to encourage potato-growing with the object of making the North more self-supporting in the matter of its food crops.

Greater interest is being shown in English potatoes than formerly, and an increase in the area cropped is gradually taking place. Owing to climatic conditions in the more tropical belt the crop is grown in the autumn and winter. On the Tableland the planting seasons synchronise more or less with those of Southern Queensland. To keep up a continuity in the supply of seed a method of alternatively planting it on the Tableland and coastal land is being tested out.

Experiments in the cool storage of special varieties of seed potatoes have also been successfully carried out. In the variety trials conducted by the Department, where upwards of fifty different kinds of potatoes were grown, yields of several tons per acre were not uncommon. Some excellent samples were shown.

Yams.

Five different samples of North Queensland-grown table yams were on exhibition, comprising the following varieties:—South Sea Island, Rabaul, Trobiand, Mamie, Millie.

Although not grown in commercial quantities, yams of good flavour and quality are relished by those who are familiar with their use.

Wilt-Resisting Tomatoes.

The Bowen district supplies the Southern markets with large quantities of tomatoes which, in favourable seasons, exceed 200,000 cases per annum.

The Northern-grown crop is marketed before the Southern tomatoes are ready, with the result that prices are usually fairly good. Prior to the introduction by the Department of "wilt-resistant varieties" heavy losses were sustained by Bowen growers. The Northern Instructor in Agriculture (Mr. N. A. R. Pollock) has taken a keen interest in the introduction, testing, and subsequent distribution of seed of several varieties of tomatoes, which have been more or less adopted as standard, wilt-resistant types, the good flavour and carrying capacity of which have established an excellent reputation for Bowen as a tomato producing centre. The kinds in favour are Bowen Buckeye, Denisonia, Norton, Norduke, Columbia, and Moseiawn.

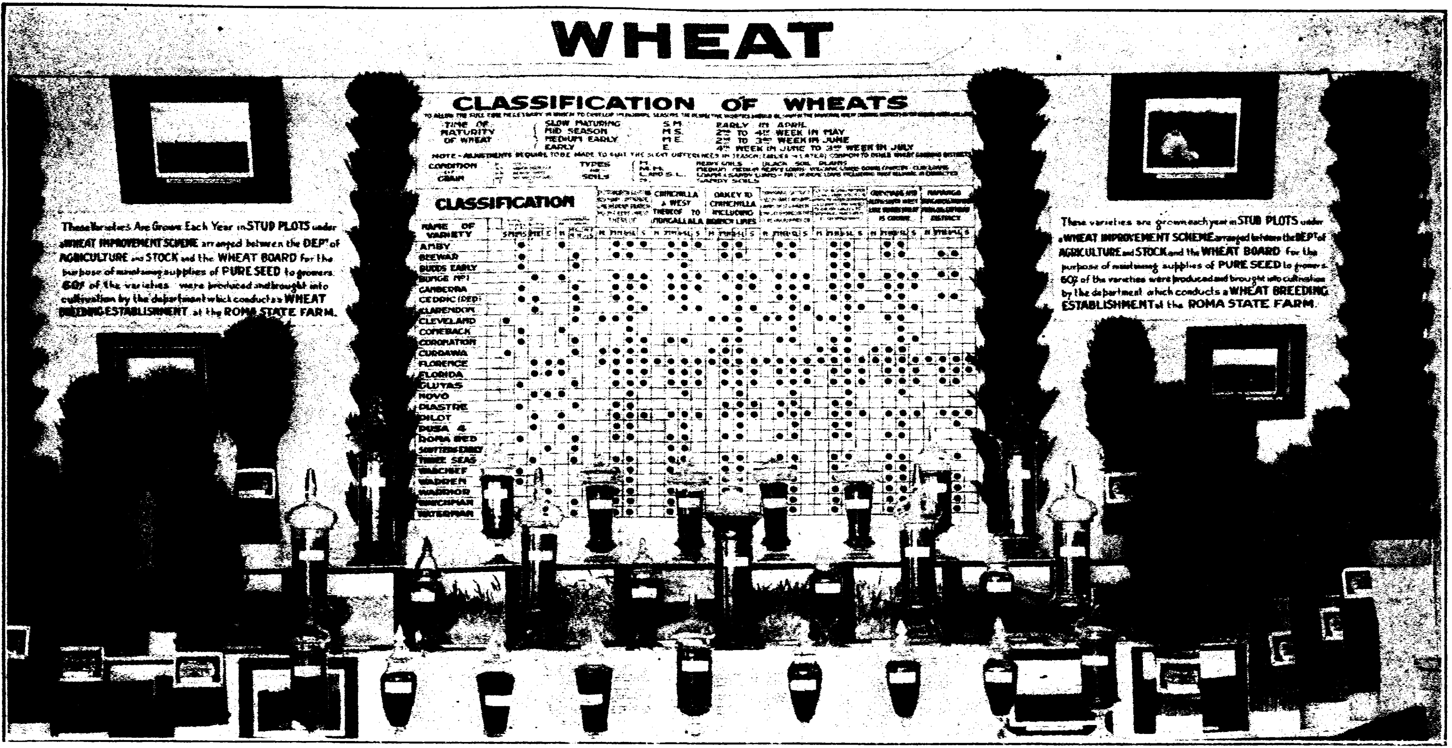

WHEAT
CLASSIFICATION OF WHEATS
TIME OF MATURITY OF WHEAT
SLOW MATURING S.M. EARLY IN APRIL
MID SEASON M.S. 2nd TO 4th WEEK IN MAY
MEDIUM EARLY M.E. 2nd TO 3rd WEEK IN JUNE
EARLY E. 4th WEEK IN JUNE TO 3rd WEEK IN JULY
CLASSIFICATION
NAME OF VARIETY
AMBY
BEEWAR
BUDDS EARLY
CANBERRA
CLARENDON
CLEVELAND
COMEBACK
CORONATION
FLORENCE
FLORIDA
FLUTAS
NOVO
PIASTRE
PILOT
PUSA 4
ROMA RED
THREE SEAS
WARCHIEF
WARDEN
WARRIOR
WATCHMAN
WATERMAN
These Varieties Are Grown Each Year in STUD PLOTS under WHEAT IMPROVEMENT SCHEME arranged between the DEPT. of AGRICULTURE and STOCK and the WHEAT BOARD for the purpose of maintaining supplies of PURE SEED to growers. 60% of the varieties were produced and brought into cultivation by the department which conducts a WHEAT BREEDING ESTABLISHMENT at the ROMA STATE FARM.
These varieties are grown each year in STUD PLOTS under WHEAT IMPROVEMENT SCHEME arranged between the DEPT. of AGRICULTURE and STOCK and the WHEAT BOARD for the purpose of maintaining supplies of PURE SEED to growers. 60% of the varieties were produced and brought into cultivation by the department which conducts a WHEAT BREEDING ESTABLISHMENT at the ROMA STATE FARM.

PLATE 64.—A POPULAR PANEL IN THE DEPARTMENTAL COURT.

Through systematic breeding the Department has been a forcing factor in quadrupling Queensland's wheat yield.

"Wheat, wheat, wheat! When it comes my turn to meet
Death the Reaper, an' the Keeper of the Judgment Book, I greet,
Then I'll face them sort of calmer, with the solace of the farmer,
That he's fed a million brothers with his wheat, wheat, wheat!"

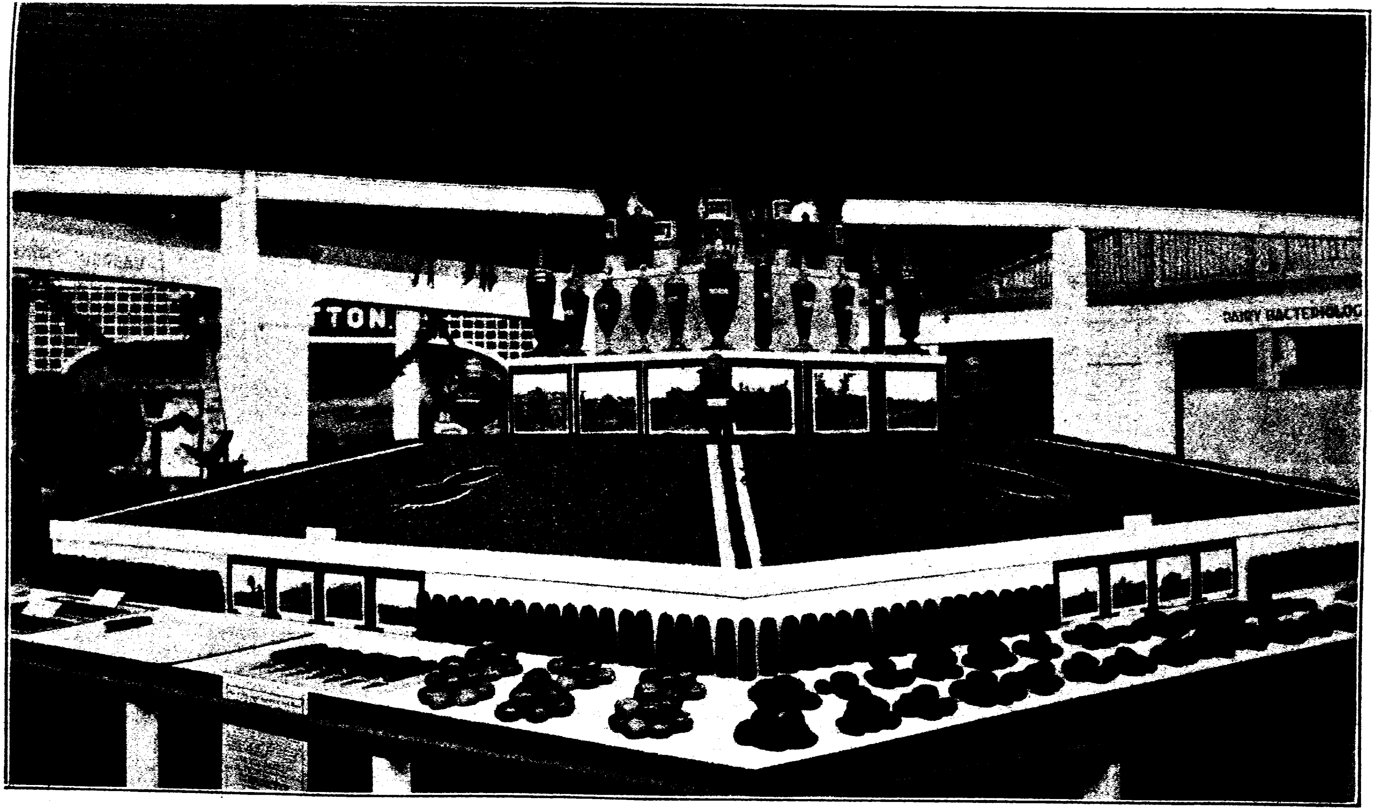


Plate 65.—Maize is King. The Beautiful Central Feature of the Court of the Department of Agriculture.

This was regarded by experienced judges as one of the finest maize exhibits, from point of view of quality of grain and educational value in resrect to seed selection, ever staged at an Australian show. The work of the Director (Mr. H. C. Quodling) and Field Officers of the Agricultural Branch, as illustrated by this and other excellent Court features, won widespread favourable comment from visiting farmers and others interested in rural progress.

Broom Millet.

The recent Commonwealth embargo prohibiting the importation of Broom Millet to prevent the introduction of the European corn borer, an insect the cause of widespread destruction in other countries, has given producers an added interest in this crop. A shortage of supplies manifested at the end of last season caused prices to rise and acted as an additional incentive to growers whose product is now marketed under the existing pool system.

It is recognised that bountiful summer rains and the existing favourable climatic and soil conditions are contributory to the production of good-quality fibre in Queensland. Unfortunately, many growers have shown indifference in the curing, classification, and get-up of their product, with the result that an industry which appeared directly capable of expansion is experiencing a pronounced check.

PLATE 66.—AN EDUCATIONAL EXHIBIT IN THE DEPARTMENTAL COURT.

Queensland grows her own millet and makes her own brooms—an advancing industry which illustrates the inter-dependence of healthy primary and secondary enterprise.

The primary essentials in working up a trade and extending it are to create a demand for goods of standard quality and of attractive appearance, and additionally to maintain supplies when repeat orders are received.

The short-sighted policy of growers in forwarding unclassed, discoloured, badly graded, irregular bundles similar to that on exhibition, which had been taken at random from the State Produce Agency's floor at Roma street—which is acting on behalf of the growers' own representatives on the Broom Millet Pool Board—is simply jeopardising prospects of finding and keeping suitable markets for Queensland's surplus broom millet.

Model 16 Silky Oak. Sixteen Guineas

Notwithstanding the many improved makes of machines offered for sale there is nothing on the market to-day that can

On Real Merit deprive the

Symphona

of its claim to Supremacy

There is an Unassailable Scientific Reason

Extract from a letter received from a well-known Sydney Musical Enthusiast—

> "I had no difficulty in unpacking and setting up the Symphona The moment of starting was rather an exciting one for me as my judgment of tone value was new to be judged, but the first tones re-assured me, as I listened I was satisfied. It is all I thought it to be as I listened in your warehouse, and it got my folk much as it got me."

Symphonas are to be found in a number of New South Wales musical homes. We want you to hear it.

KING & KING

LIMITED

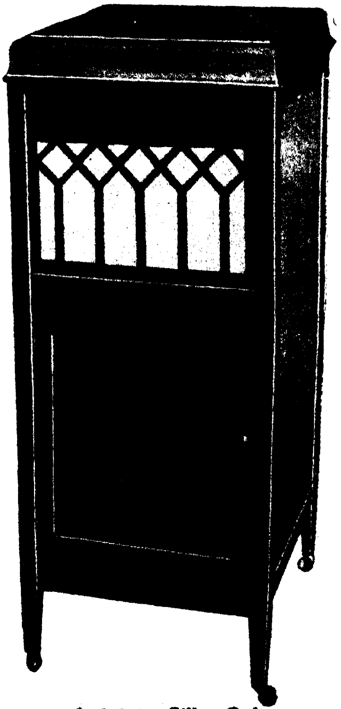
Music Warehouse
Queen St., Brisbane

Patentees and Manufacturers of the

Symphona

TABLE MODELS—
£4 to 12 guineas
CONSOLE MODELS—
16 to 85 guineas
CABINET MODELS—
20 to 63 guineas

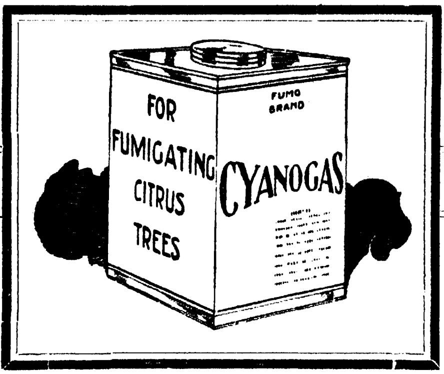
Write for illustrations giving detail, particulars of prices, material and equipment. We CANNOT illustrate the TONE, you MUST hear it for yourself. When in Town, call and ask for a demonstration.



Model 20 Silky Oak
Twenty Guineas

CYANOGAS

(CALCIUM CYANIDE)



It is the Gas that kills them

Cyanogas is a dust which when brought into contact with the air releases hydrocyanic acid gas—the deadliest gas known. It positively KILLS every living insect.

Cyanogas has been proved to be the only effectual remedy for—

BANANA THRIP, all Scale Insects infesting Orange Trees, including PINK WAX, RED, BROWN, MUSCELL, Etc. WHITE LOUSE, GREEN ORANGE BUG and any insect that breathes.

We carry in stock large supplies of— PARADICHLOROBENZENE, ARSENATE OF LEAD, PARIS GREEN, BLACK LEAF 40, "HARBAS" RED OIL, "HAROLA" LIME AND SULPHUR, WEED KILLER, BORDEAUX MIXTURE, BLIGHTY

And the most efficient means of combating Vegetable, Cane, Cotton, and Orchard pests. Also a complete range of SPRAY PUMPS and DUSTERS by the world's most renowned manufacturers.

This department of our business is in the capable hands of an instructor lately associated with the Hawkesbury College, N.S.W.

Consult us on your agricultural problems. Catalogue H.13 free on request.

BUZACOTTS (Q'ld.) LTD.

373A ADELAIDE STREET, BRISBANE.

To try and bring home the seriousness of the present position the Department exhibited a well-classed bale of millet alongside of the sample bundle referred to. The former class of bale can safely carry a distinctive brand and will command attention in any market. It was specially pressed for the purpose by one of the Departmental Agricultural Instructors within a rough timber framework, the pressure being supplied by a Wallaby Jack, a method of preparation within every growers' reach.

To make the Broom Millet exhibit as educational as possible a range of samples from one of the Department's experiment plots was displayed, and served to show the different grades and lengths of fibre into which a crop should be classed; also the kind and character of brush necessary when seed heads are being selected.

Officers of the Field Branch of the Department have been engaged for some years in the improvement in the yield and quality of Broom Millet fibre, which can only be brought about by adopting a system of rigid selection.

NATIVE GRASSES.

The value of wool exported from Australia for the last five years amounted to the grand total of £258,357,070, and practically all this wealth was primarily derived from indigenous grasses and pasture plants. If we add to wool the value of beef, mutton, and dairy products, the great value to Australia of good pastures is at once apparent.

Queensland's natural pastures are unrivalled, as the collection of grasses staged by the Department bears testimony.

There is no doubt that, with the extension of the grazing industries, the better grasses in some of the more closely settled areas have been eaten out, allowing coarser, less palatable species to grow; and the problem of pasture improvement is one worthy of research. A great deal can be done in the way of pasture improvement by judicious stocking and conserving and propagating the better species such as the Mitchell Grasses, Flinders Grass, Native Panic Grasses, &c.

Among the Andropogons exhibited with other specimens in the Departmental Court were the far-famed Blue Grass and the Satin Top, the former being one of the very best for fattening and grazing purposes. The genus Astrebla comprises the highly esteemed Mitchell Grasses, of which four very distinct kinds are found in Queensland. The chief characteristic of these and some other inland species of grasses and herbage is not only their drought-resisting properties, but also the rapid way in which they respond to falls of rain after long periods of drought, their value in this respect being nothing short of marvellous. Among the Star Grasses, to the same genus of which belongs the imported Rhodes Grass, are several sorts esteemed for their fodder value. The genus Anthistiria contains the well-known Kangaroo Grass and a near ally of this is the Flinders Grass which, both in a green and a dry state, is so much relished by stock. Quite an array of Panicums or Native Panic Grasses were on view, most of these grasses possessing high feeding values. Beautiful grasses and at the same time useful in the native mixed pastures are various species of Eragrostis or Love Grasses. The Button Grass and the Crow Foot are cosmopolitan species; the first mentioned is a most valuable sheep grass. Brown Top bears a good reputation among some stockowners. Several species of native paspalums were shown, some being of high food value, particularly for tropical parts. The native sorghums are coarse grasses, but when cut or grazed down, both horses and cattle do well on them.

The fact was impressed on visitors to the Show that the Department is always willing to identify and report on any specimens of grasses and other plants. Specimens may be sent to the Department of Agriculture and Stock, or direct to the Government Botanist.

POWER ALCOHOL.

Australia needs to be concerned in its fuel supplies for internal combustion engines when the fact is made known that the annual consumption of petrol in the Commonwealth is 124,000,000 gallons, 70,000,000 of which are imported from U.S.A. and 54,000,000 from the Dutch East Indies, and this huge consumption is on the increase.

Notwithstanding efforts made to locate petroliferous supplies in Australia and New Guinea, appreciable quantities are not yet available. Investigation and exploratory work is still proceeding with good prospects of ultimate success.

The commendable action of the directors of the Plane Creek Sugar Mill, at Sarina, in spending £120,000 in the erection of an up-to-date plant for the distillation of Power Alcohol from Molasses, and its adaptation for use when required for

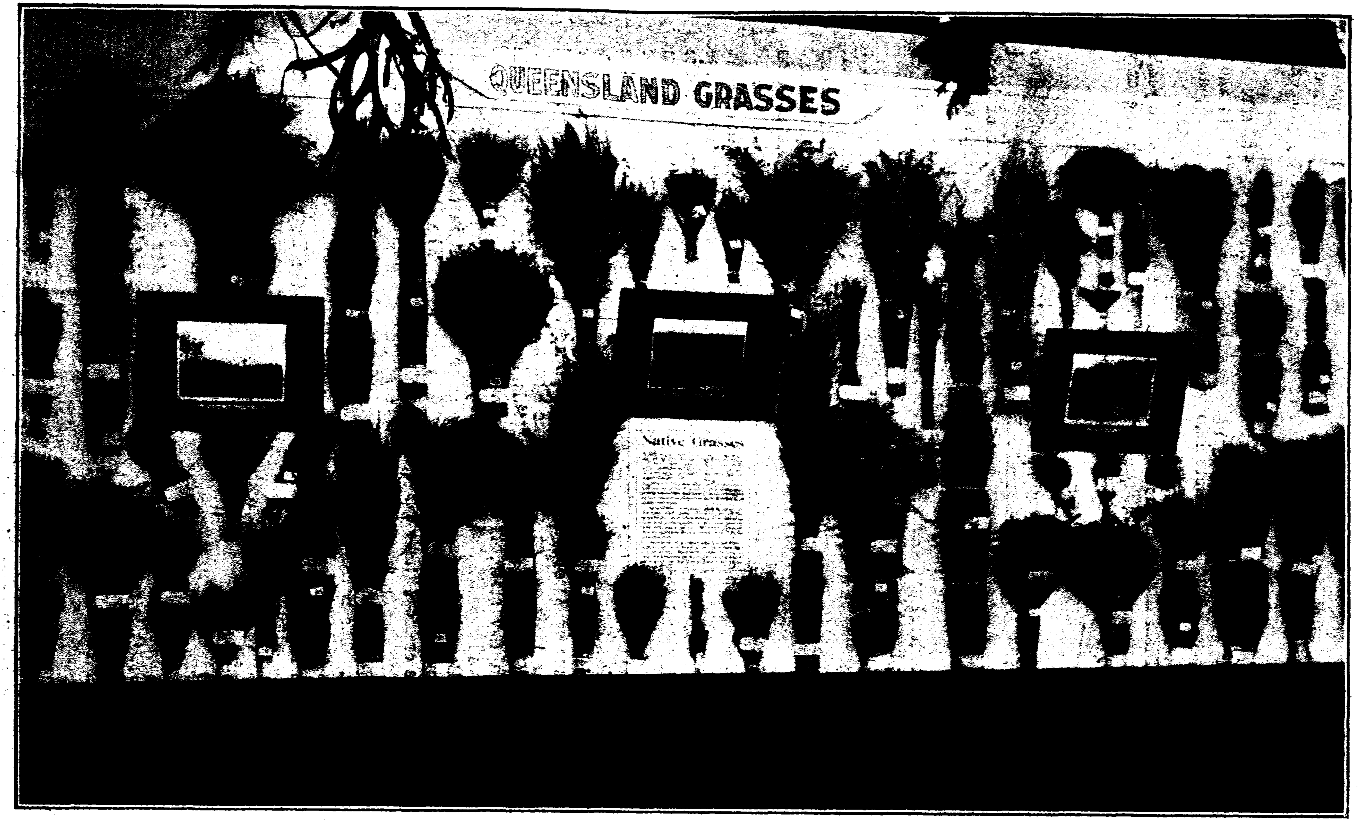


PLATE 67.—QUEENSLAND'S WEALTH IN NATURAL PASTURES ILLUSTRATED.

An attractive panel in the Court of the Department of Agriculture. The total value of Australia's Wool Exports for the last five years amounted to a grand total of £258,357,000. Practically all this wealth came primarily from our rich indigenous grasses.

Plate 68.—The Fuel of the Future—Oil from the Soil.

A new industry in the making. This panel of Tropical plants and their products was one of the most instructive exhibits in the Departmental Court.

the treatment of starch-producing crops for the same purpose, ranks as one of the most recent important industrial undertakings in the State. Operations were commenced in January this year.

Apart from certain financial assistance rendered by the Government to the company concerned, the Department of Agriculture and Stock has closely associated itself with the production of Cassava and other starch-producing crops. Last year an officer was sent to Java to study cultural conditions applied to cassava growing, and his mission also was to arrange for shipments of cuttings for planting out in the neighbourhood of Sarina.

One million cuttings of different varieties were subsequently imported and planted. Experiment plots for the carrying out of comparative trials and for the testing of special varieties of Cassava were established. Other starch-producing crops, in the way of Arrowroot and Sweet Potatoes, are also undergoing trial. Data is not yet available to determine whether Cassava can be grown and utilised on an economic basis for Power Alcohol production. Some excellent crop yields were obtained at the various experiment plots, and plans have been formed to extend operations. All these activities were illustrated strikingly by a most instructive display of products and processes in the Departmental Court.

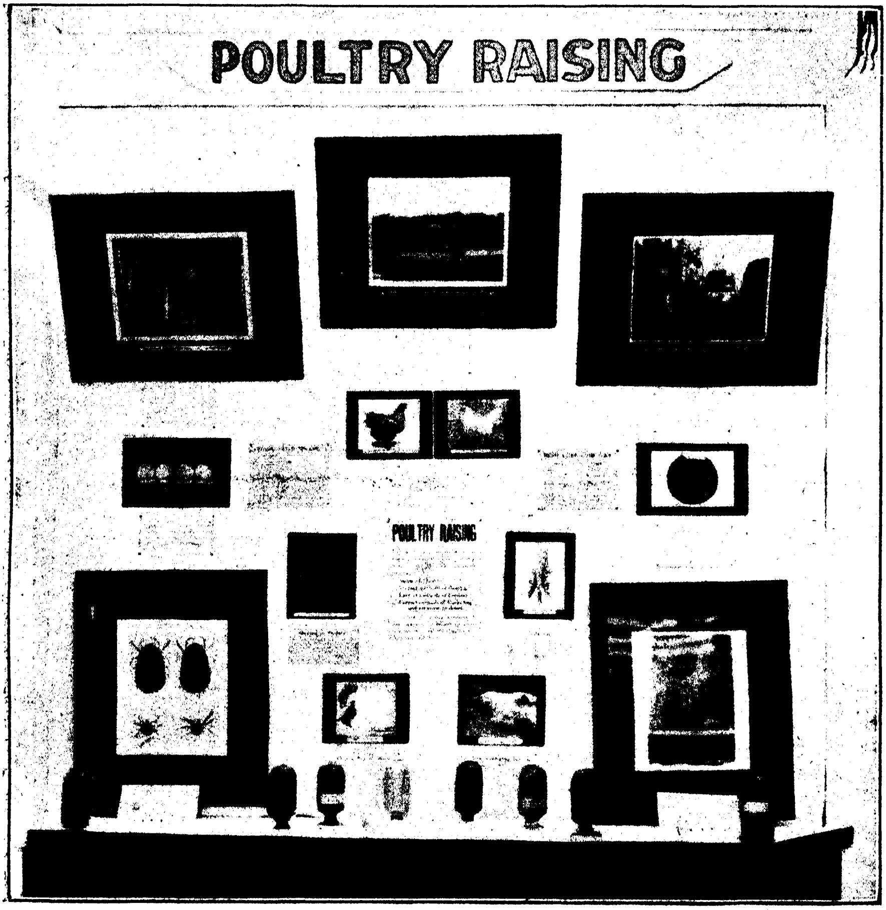


PLATE 69.—AN ILLUSTRATION OF DEPARTMENT'S EDUCATIONAL WORK.

Poultry raising is now recognised as one of the best farm side lines, and is approaching the status of a staple industry in Queensland. Its annual value to State is approximately £700,000, estimated conservatively.

POULTRY.

In the Departmental Poultry Exhibit, Egg Laying Competitions were featured with the object of bringing out the points of careful breeding, which is necessary in the first place to make poultry profitable.

Another illustration was that of the Mammoth Incubator. A fine range of photographs showed the industry in its varied operations. Producers could learn from the exhibit that it is possible for them to buy stock from reputable breeders, thereby increasing the general productivity of their flocks without adding to the general labour on the farm.

The export of eggs was well featured. The growth of the industry has been remarkable during the last few years, necessitating heavy overseas export. The quality necessary was illustrated by a picture of the germ development of the egg. The poultry tick and its ravages also received prominence in the display. Pictures of this pest through its complete life cycle were shown, and when it is known that it is responsible for a loss to the poultry industry in Queensland of over £50,000 per annum, the prominence given to the question of the tick could be understood. Common diseases of poultry, and their more or less simple treatment, were also illustrated in an exhibit of high educational value.

QUEENSLANDS' WEALTH IN WOOL.

Many excellent exhibits of Queensland's great staple industry were included in district exhibits. The Department of Agriculture and Stock had a magnificent display in its Court, in which a highly educative trophy based on fleeces and pieces, arranged by the Instructor in Sheep and Wool, Mr. W. G. Brown and his assistant, Mr. J. Carew, was a conspicuous feature. Experts, both of the run and the wool room, were immensely pleased with its appearance and comprehensiveness. It was most elaborate, and wool information and samples were so tabulated and arranged as to convey to even the casual observer an idea as to the stages in sequence of converting wool from its greasy state to the finished fabric. Queensland being probably the finest Merino country in the world, samples of this wool predominated naturally. Coastal and crossbred wools were also displayed to advantage. All were bright, clean, fine up to superfine, and high-yielding—most attractive wools of the highest quality. ''As good as any fleeces the Department has ever handled,'' was the verdict of Mr. Brown.

In the several district exhibits wool was a prominent feature. The numerous entries and fine exhibits indicated strongly the increasing bias of farmers and small holders generally towards sheep raising as an adjunct to their other undertakings. Wool in the Departmental Exhibit prepared by Mr. W. G. Brown were all typical Queensland wools, shown according to district of origin.

The operations of the Departmental Wool Scheme are extending rapidly. It is of great advantage to the smaller holders to have their wool handled well, and put in an attractive form before the buyers, and this work was well illustrated.

Other striking evidences of the activities of the Department in the Wool and Sheep Branch were well presented. Lectures, by radio and otherwise, practical advice and land inspection are all routine matters in this Branch.

SUGAR INDUSTRY.

Display by the Bureau of Sugar Experiment Stations.

The cane exhibited this year by the Bureau of Sugar Experiment Stations included a number of varieties from Hawaii, West Indies, Java, India, Mauritius, Fiji, and Queensland. The Queensland canes included a number of new varieties raised from seed at the Sugar Experiment Station at South Johnstone. Up to the present about 7,000 of these seedlings have been raised, but many of them, of course, are weeded out in the process of selection. Commercial trials of the best of them are now being undertaken. One of the objects of the Sugar Experiment Stations has been the introduction and testing of new varieties. Before any cane varieties are allowed to leave the Experiment Stations they have to pass chemical and commercial trials through plant, first ratoon, and second ratoon crops.

Each variety is tested not fewer than four times in the course of the sugar season, so that records are obtained giving farmers and millowners information whether canes are early or late, and whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials in the field, so that it may be determined whether such varieties are good croppers. They are further keenly watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance

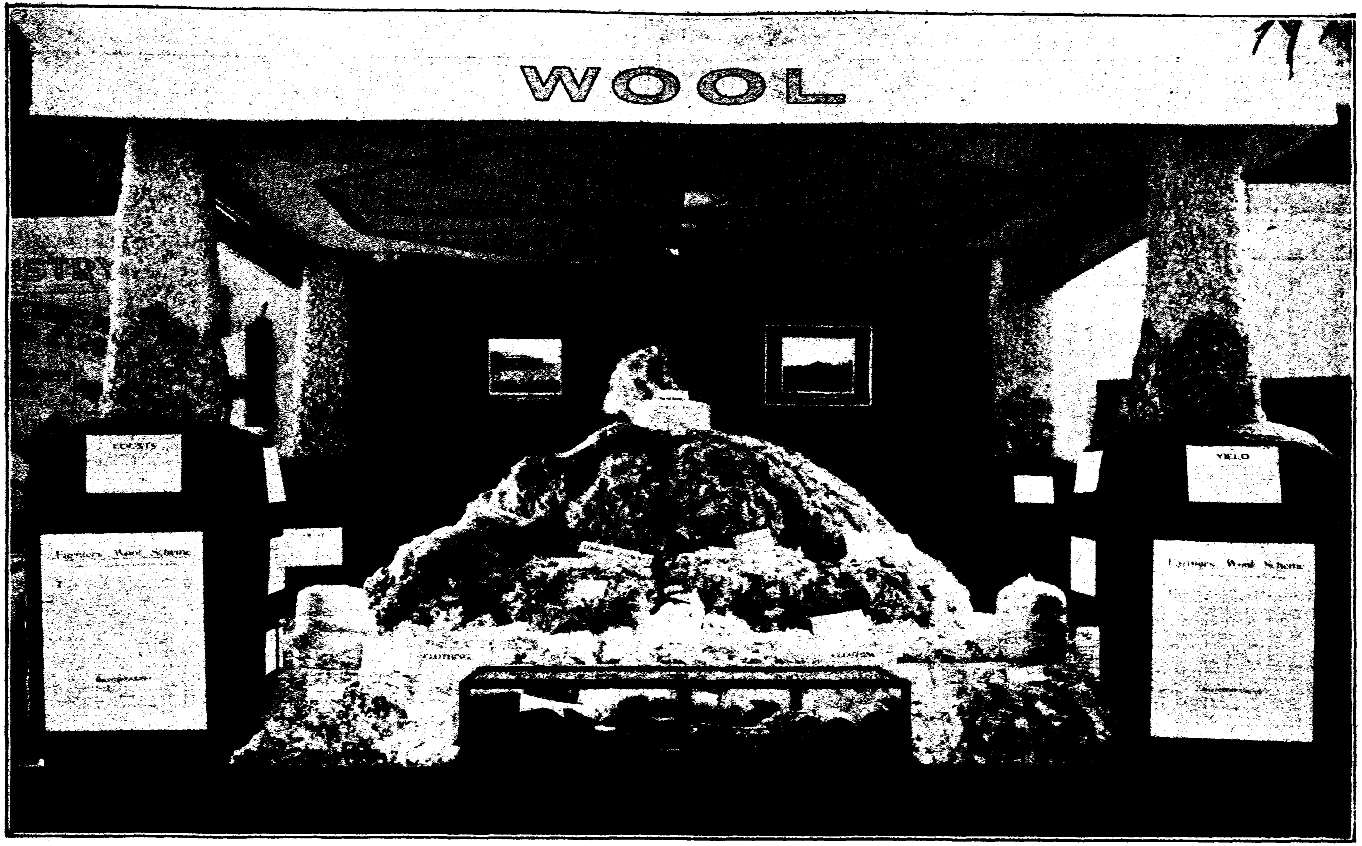


PLATE 70.—FLEECES FROM QUEENSLAND FLOCKS—A STUDY OF "COUNTS" AND CLASSES IN THE DEPARTMENTAL COURT.

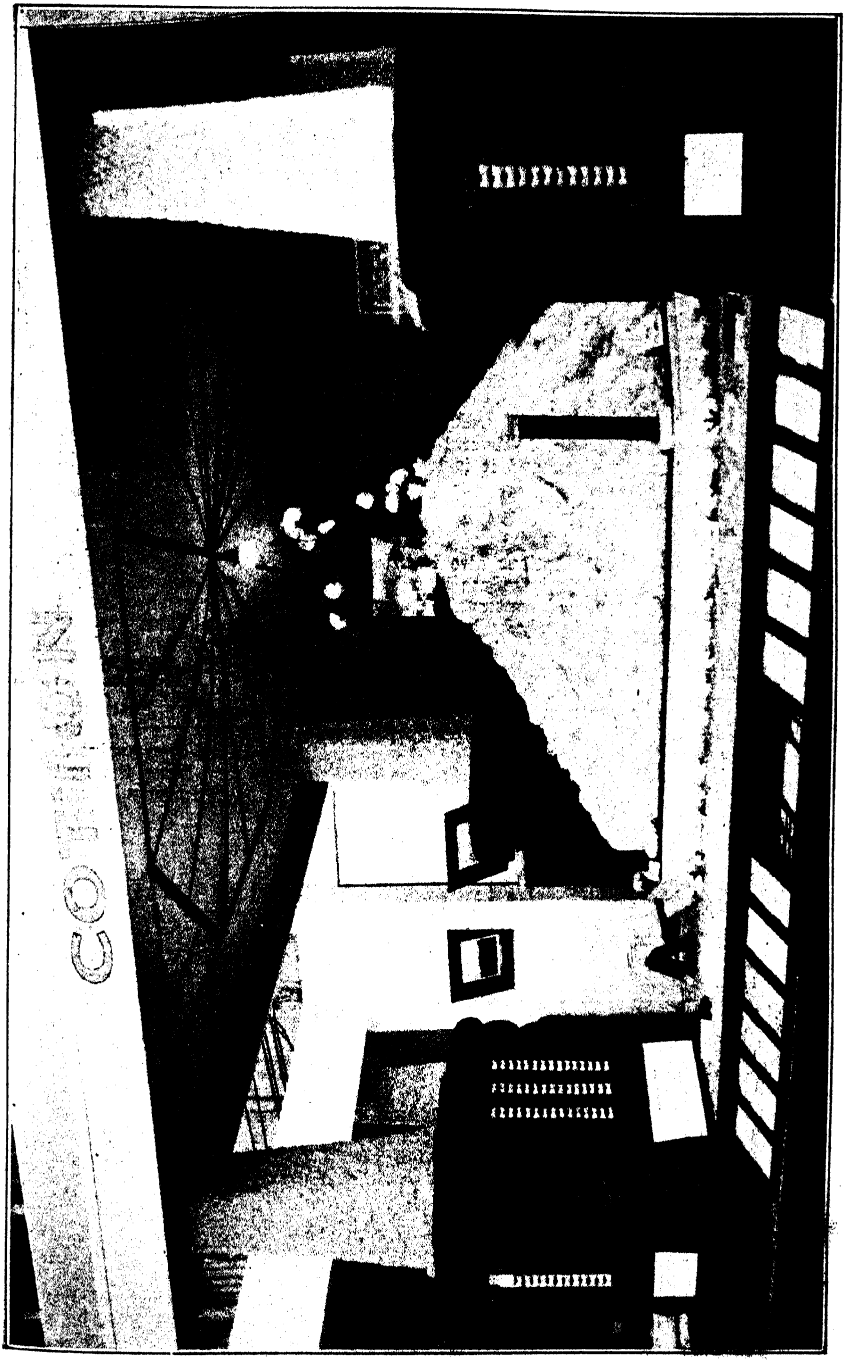


PLATE 71.—WHITE AUSTRALIA'S "WHITE HOPE."
Queensland's progress in cotton culture was illustrated in this artistically arranged exhibit in the Court of the Department.

from the stations. All canes are distributed free to canegrowers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at the cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

Full descriptions of the varieties exhibited appeared on the cards attached to the canes, which also give commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period and are being distributed to canegrowers. These varieties, however, included a very small part of the number of new and tested canes that have been distributed from the Experiment Stations in the course of the past twenty years.

Sugar-cane Propagation.

The Sugar Experiment Station at South Johnstone, near Innisfail, has, during the past six years, been engaged in the direction of raising cane from the seed found in the arrows. This requires the utmost care, as the seed is very minute and has to be handled most carefully. Specially prepared boxes of soil are used, which have previously been sterilised. The cane arrows, when mature, are gently broken off, spread over the soil, watered, and then covered with glass plates. When germination takes place, a large number of minute shoots like grass appear. When these have made further growth they are carefully pricked out into pots or boxes, and are ultimately removed to the field. Several of them which were taken from Badila cane have Badila characteristics, and it is trusted a cane equal to the Badila will be discovered.

Study of Soils.

Work at the Experiment Stations also includes the study of soils, cultivation, and fertilizing. It is sought to introduce improved methods of cultivation, liming, fertilizing, rotation of crops, and conservation of moisture, and growers are taught the principles of cultivation methods by visits to the Experiment Stations, by lectures and addresses delivered in the various sugar districts, and by the issue of bulletins. It is claimed that this work has been highly successful. The Sugar Experiment Stations analyse soils free for canegrowers, and give advice by personal interviews or by letter, on the requirements of the soil in the way of application of lime where necessary, green manuring and fertilizers, and the treatment of the land by proper soil handling. Upwards of 1,500 cane soils have so far been analysed. Cane samples are also tested free of charge, so that growers may know the best time at which to cut their cane. Field officers move around amongst farmers, giving advice on cultural operations.

Investigation and Research.

Investigation and research work in connection with the most serious pest of the sugar-cane, namely the grub, is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins have been issued upon the subject. The entomological laboratories are situated at Meringa (near Cairns), and at Bundaberg. Chemical fumigants are being successfully used in the destruction of cane grubs. A pathological staff is being established to deal with diseases in cane, and travelling pathologists are advising cane farmers on disease questions.

The work of the Sugar Experiment Stations, in relation to the promotion of the agricultural welfare of Queensland, cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce about 430,000 tons of sugar this year, estimated to be of the value of over £9,000,000, it can be seen how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North.

Sugar Belt.

Apropos of the sugar industry, it is to be noted, on reference to a map of the State, that the land in Queensland used for sugar-growing is included in a long narrow coastal belt. Parts of this belt are separated from each other by considerable tracts of non-sugar country. The latter, owing to a deficient rainfall or poorness of soil, are not utilised for cane. This belt is included between latitudes 16 degrees and 28 degrees south, and the bulk of the staple is grown within the tropics.

Rainfall.

The Queensland rainfall fortunately is highest during the summer period, at which time the cane plant makes its maximum of growth. The following are average rainfalls in the principal sugar-growing districts:—Cairns, 92.65; Johnstone River, 160.88; Herbert River, 84.91; Mackay, 66.67; Bundaberg, 44.40. Cane grows best when the relative humidity of the atmosphere is high, and this is the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and in 1925 reached 485,000 tons, the record crop to date.

The yield of cane and sugar per acre is improving, due to better methods of cultivation and growth of superior canes. The mills have also largely increased their efficiency, and over £1,000,000 have been spent during the past five years in improving existing mills, while, in addition, the Queensland Government have erected the most up-to-date sugar plant in Australia in the Tully River district.

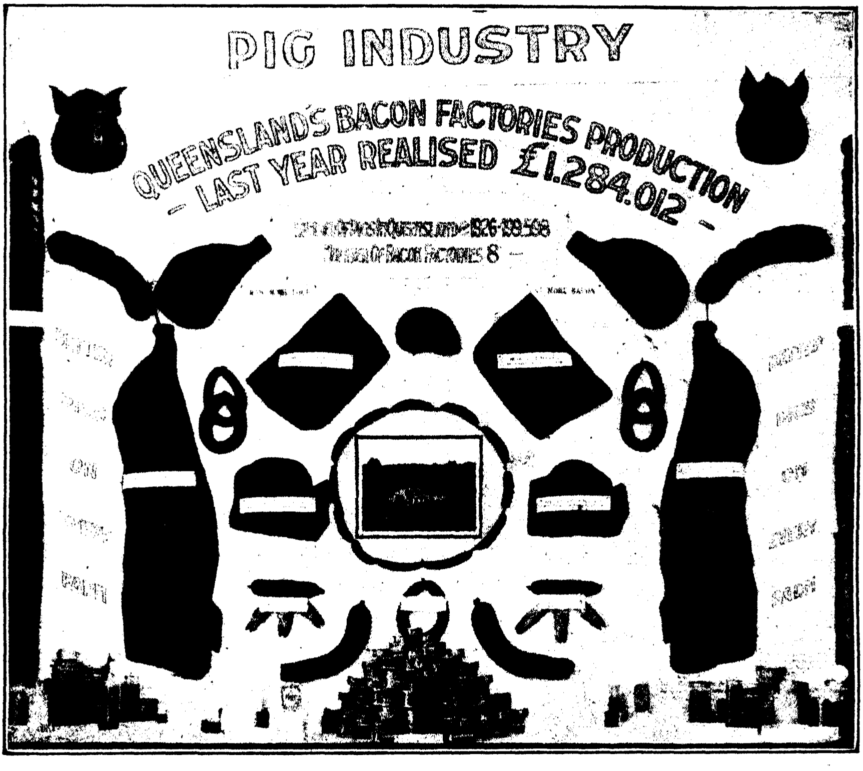

PIG INDUSTRY
QUEENSLAND'S BACON FACTORIES PRODUCTION
— LAST YEAR REALISED £1.284.012 —
1926 139.598
BACON FACTORIES 8 —

PLATE 72.—PIGS FOR PROFIT. THE DEPARTMENT'S EDUCATIONAL WORK ILLUSTRATED.

PIG RAISING.

From a financial point of view the pig industry at present represents, in round figures, a return to the State of well over £1,250,000 sterling annually, and the returns are increasing every year. That it pays to follow Departmental advice and breed more and better pigs on every farm is being advocated widely in every district throughout the State. Mr. E. J. Shelton, Instructor in Pig Raising, and his assistant, Mr. F. Bostock, again staged an instructive and attractive display in the Departmental Court, featuring the great variety of products manufactured or obtained from the carcass of the hog. The exhibit included the ordinary commercial products, hams, sides of bacon, flitches, shoulders, middles and rolls, arranged around a central enlarged photograph of a profitable and prolific breeding sow and her family not yet ready, but en route to the consumer's plate. Along with these products were shown numerous manufactured lines, including Strasburg and Devon sausage, ham delight, and other varieties of small goods, pure lard and lard oil. Included in the canned goods section were camp pies, luncheon tongues, pork brawn, pork and beans, sandwich delicacies, and the like.

Surmounting the display was an attractively worded display scroll, indicating what Queensland's pork and bacon industry is worth to the State, while the total number of pigs in the State was also given. At the base of the display of manufactured lines of edible products were numerous inedible lines, including pig hair, glue pieces, trotters, sausage casings, blood and bone meals, and so on.

Display in Meat Hall.

Included in the great variety of products displayed in the new Live Stock and Meat Industry Hall was a comprehensive display of the products of the pig arranged by the Instructor in Pig Raising and his assistant, with the co-operation of representatives of the various bacon factories and the State butcheries. The display of fresh pork products, specially prepared and arranged under the supervision of Mr. Brunckhurst, the manager of the State butcheries, included every line catered for in the fresh pork trade as prepared from the carcases of prime-quality porkers, such as are suited to the requirements of city, suburban, and country butchers, and small goods shops. These lines are all methodically arranged, leading off from an enlarged "cut out" of a prime-quality pig, such as is advocated for use in this business.

PLATE 73.—IN THE RING

Seated in the centre is Major-General Spencer Browne, the veteran horse judge who commanded a Brigade on Gallipoli, talking "horse" with other keen judges of the "waler" and the Clydesdale.

THE CLYDESDALES.

While, as is usually the case in an agricultural and sporting community, the horse section of the Show is exceptionally well catered for, special mention must be made of the magnificent display of Clydesdale draught horses at this year's Show. Seen in their stalls immediately prior to entering the ring for judging, these patient and enormous—one might almost say elephantine—beasts of burden presented a striking picture of power and muscle. And here, let it be said, for the benefit of those who regard the all-conquering motor as having swept the horse off the face of the earth for all utility reasons, that there is still work for the draught horse. It is stated that even in the city, where questions of short haulage are paramount, the gigantic Clydesdale is more economical and of more general use than the internal combustion engine; and on the farm one ventures to think it will be long before these splendid friends of man are altogether displaced.

Great flanks shining, and manes and tails combed and curled, coloured woollen decorative effects serving as eye-catchers, the placid and gentle Clydesdales blinked sleepily at the observer, obviously quite unperturbed and unconcerned about their imminent fate at the hands of the judges. In some of the boxes prospective champions were accompanied by stable companions, whose rough and shaggy coats contrasted sharply with the well-groomed perfection of their mates. The Clydesdales were a living example in the equine world of how much breeding matters, even in "manual" toil, and no less care is expended on the pedigree of these magnificent specimens of their class than on that of our foremost blood stock racers. Last year's champion, Mr. James Sprott's The Intent, was again prominent, and it will be hard to find his equal, fine specimens as his rivals undoubtedly are. The stallions purchased by the State Government for the improvement of farmers' draught stock again came in for a full measure of admiration.

DAIRY CATTLE—HIGH STANDARD OF QUALITY.

What is rapidly becoming one of the foremost industries of Queensland is naturally exceptionally well catered for—the exhibit of dairy cattle. All the well-known breeds were in evidence, and competent judges agreed that the high standard of quality observed last year had been fully maintained. In fact, it is doubtful if such a fine collection of animals have ever been gathered together in one place in Queensland as were shown at this year's Exhibition. One of the conditions of entry was that each animal should be registered in a recognised herd book, and there is no doubt that the systematic testing of cattle, and the elimination of all those who are not "up to the job" from the herds, is having a great effect upon the milk production standard of the State. One of the features of the Show was the milking tests, which were conducted on the showground, under the supervision of officers of the Department of Agriculture and Stock. The exhibits were drawn from all the well-known dairying districts of the State—the North Coast and Brisbane Valley areas being exceptionally well represented. Altogther the dairy cattle formed one of the main features of the Show, and provided an interesting instance of the progress of dairying in the State.

Ayrshires.

Although the Ayrshire cow shows no signs of any falling off in popularity—there were ninety-two exhibits this year under the various classes—they have not yet reached that degree of popularity with breeders in this State which is so much in evidence with the Jerseys and Illawarras. It is almost unnecessary to say that a high standard of excellence was noticeable, as obviously breeders do not trouble to exhibit inferior cattle; but nevertheless a word of appreciation in regard to this breed would not be out of place. It is quite clear that a great deal has been accomplished in the efforts to establish them in Queensland, and they should go ahead rapidly in favour among dairy farmers. Messrs. Anderson Bros., of Southbrook, Jonas Holmes, of Pittsworth, and Thomas Holmes, of Yarranlea, were the biggest exhibitors in this class. On the small side, like the Jerseys, they are just as distinctive in appearance, and some very fine types were numbered among the exhibits, notably Mr. Jonas Holmes's Tilly of Longlands, last year's champion Ayrshire cow.

Illawarra Shorthorns.

By a very large margin the Illawarra milking Shorthorn maintains its popularity among dairymen. The reason is not far to seek, and for the benefit of the uninitiated it may be explained that while the Jersey and Guernsey give the highest cream content in their milk, and the Friesian probably the largest actual quantity, the Illawarra has succeeded in combining to the best possible effect both qualities. There were no fewer than 313 specimens of this breed exhibited, and they were fully representative of all the dairying districts of the State. Last year's champion cow, Mr. A. J. Caswell's Rosie IV. of Greyleigh, was again before the judges, together with many other representatives of the well-known Greyleigh herd. The Oakvale, Blacklands, and Sherwood studs were among other celebrated studs in evidence.

Jerseys.

Second only to the Illawarras, the Jersey breed, with 198 exhibits in the various classes, fully sustained its well-deserved popularity. The onyx-eyed, calm little Jersey cows give no idea from a casual glance of the enormous value in cream content of the milk they produce in such rich quantity. Lacking the impressive size

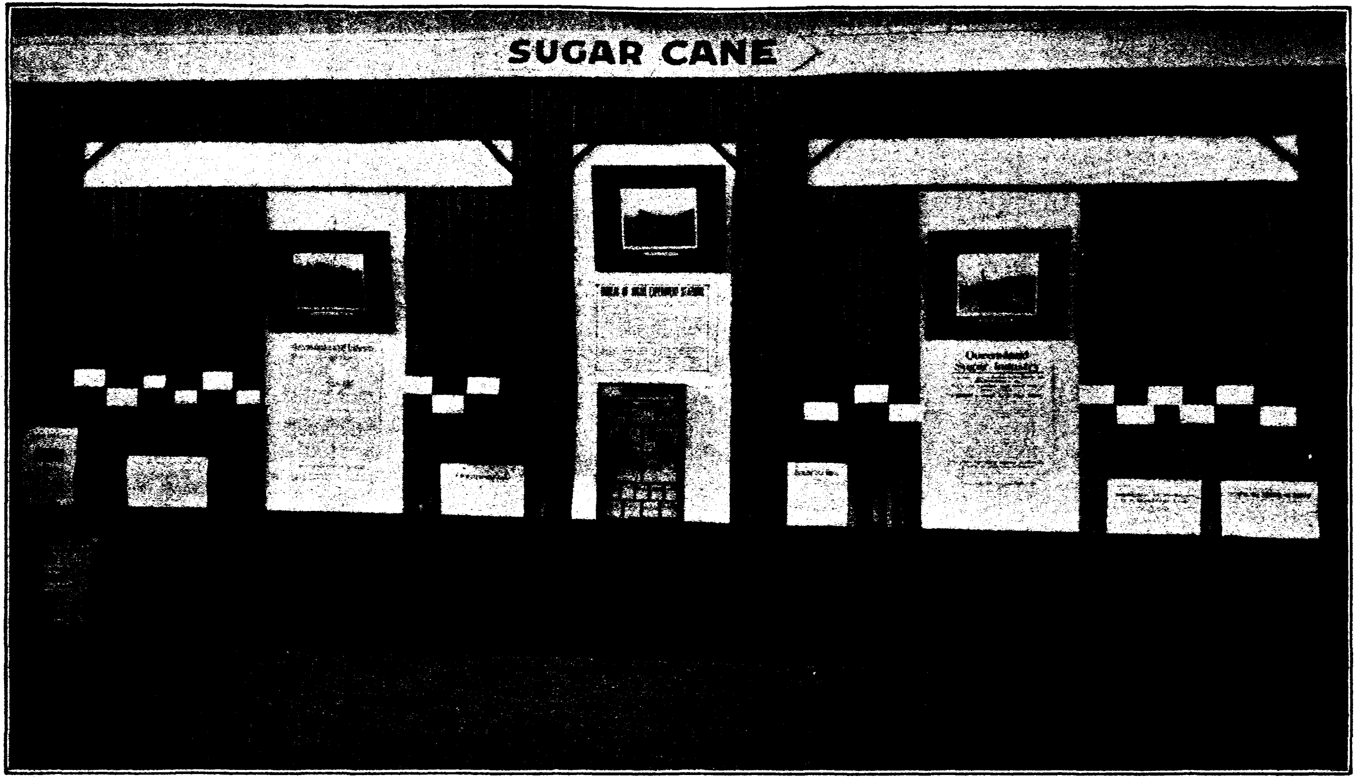


PLATE 74.—A WHITE MAN'S INDUSTRY IN A WHITE MAN'S LAND.

No other agricultural enterprise in Australia employs so many Australian workers. The great results obtained by the Bureau of Sugar Experiment Stations through systematic plant improvement and constant field effort, illustrated. The Sugar Industry is worth nearly £9,000,000 a year to Queensland.

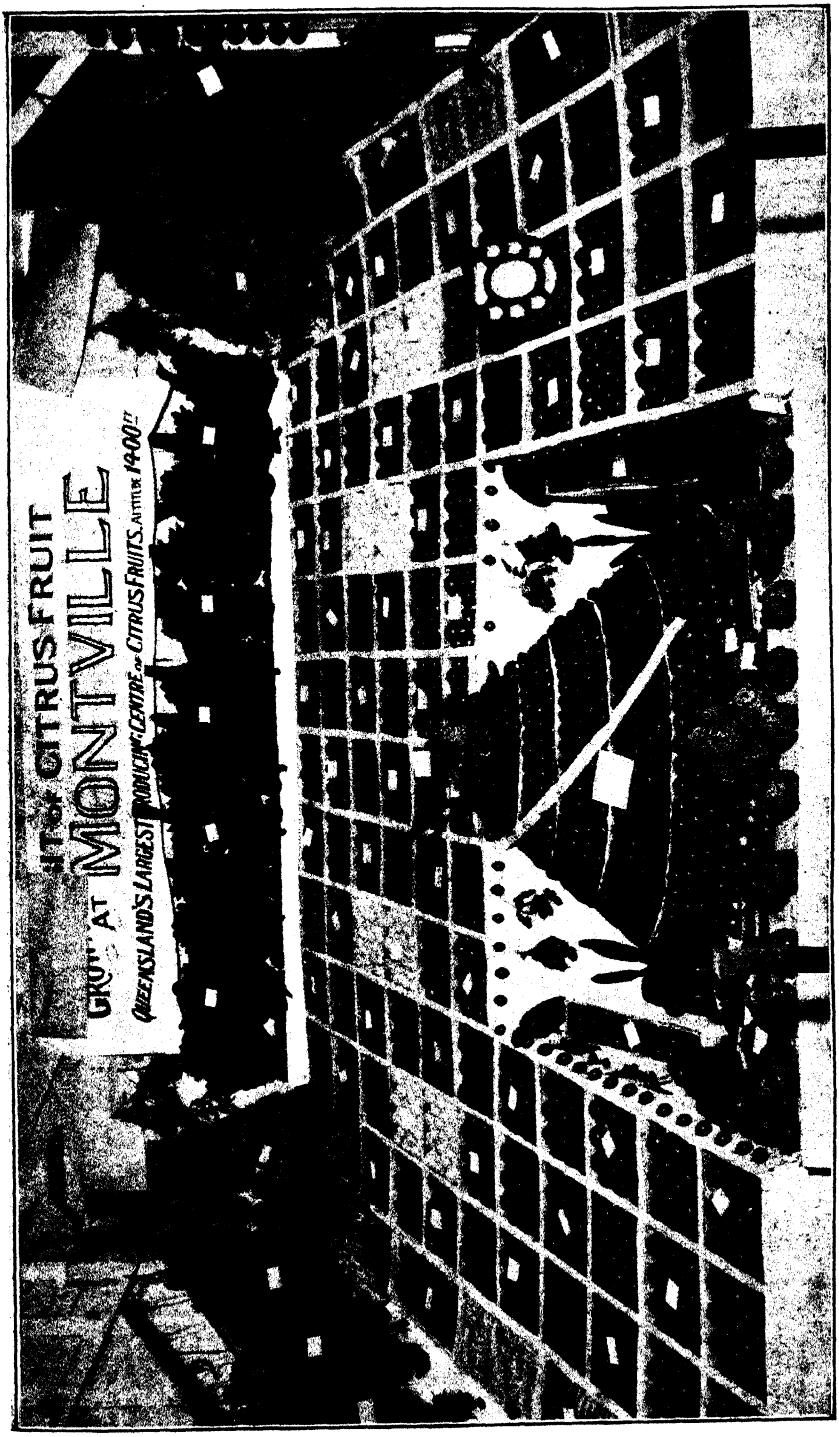

IT OF CITRUS FRUIT
GRO AT
MONTVILLE
QUEENSLAND'S LARGEST ODUCING CENTRE OF CITRUS FRUITS. ALTITUDE 1400 FT

Plate 75.—Fruits of Queensland from the Fertile North Coast.

of the Illawarra, their dun-coloured flanks gently heaving as they reflectively chew their cud, there is little outwardly impressive, apart from their beauty, about them. All last year's owners and breeders were represented, and to the casual spectator this class provided one of the most interesting of them all.

Guernseys and Friesians.

These classes of dairy cattle were not particularly well represented as to the number of exhibits, there being only three exhibitors in the former class. This would seem to show that the Jersey, whose main characteristics are practically identical, prevents the spread of popularity of the neighbouring Channel Islander. The class of cattle exhibited, however, was up to last year's standard, and indeed, if anything, was considered by judges to show considerable improvement. The Friesian was more in favour, with a total number of exhibits in all classes of eighty-one cattle. They appeared to be spread well out over the various districts from which they are drawn, and, like the other classes, many fine and valuable specimens were paraded for judgment.

DISPLAY OF THE FORESTRY SERVICE.

A Jungle in Miniature.

The Queensland Government Forest Service is an industrial tree farming and sawmilling corporation charged with the control and management, under the Minister for Lands (Mr. T. Dunstan, M.L.A.) of 5,000,000 acres of landed estates for the production of timber and forest products for the needs of Queensland.

This intimation introduced the Forest Service exhibit at this year's Show. Among the gay array of white toned displays in the pavilion the State Forestry Court loomed rather grimly as a sombre forest interior from whose green glooms projected the brown boles of tall timber, their heights are lost among their interlacing boughs overhead. Among these trees rank upon rank of hoop pines in pure sand, one might walk softly on the forest duff down canopied aisles filled with the lengthening shadows of tree trunks and dappled with such thin sunlight as succeeded in filtering down through the embowering foliage. Here and there in this Araucarian timberland great russet-barked logs of tallowwood lay prone, where the fallers and haulers had left them. Staghorns and elkhorns glinted greenly from the forest roof, and one felt that one, perhaps, even as these fallen trunks, may rest awhile from the clangour of the side shows, in this jungle quietude conjured for us there in the pavilion by the Queensland Forest Service.

Sylvan Depths.

Each year the Forestry exhibit assumes new aspects, but no more dignified presentation of the forests come to town has been yielded to show visitors than this one of 1927. The effect of cloistered sylvan depths was immense. The purpose was to reveal to the passer-by the appearance of a forest plantation of Queensland pine fifteen years after the winged, brown seed has been sown in the nursery beds. Seven by seven feet apart, these trees stood, solid trunks of grown wood, 40 to 50 feet in height, and 15 to 35 inches in girth. Such a forest plantation as this has been actually produced by the Queensland Forest Service at its Wongabel reservation in the Atherton district, and this early experimental effort gives assurance that in the new forests of man's creation now being produced there can be grown ample softwood for Queensland's future.

The Forestry Court tree plantation was life size and life like, and the atmosphere was real. But lest by its reality it should be imagined that there was a young forest slaughtered to make a Brisbane holiday, let it be known that it was just a clever reconstruction from material gathered together from felled scrub land awaiting the clearing fire.

Jewel House of the Woods.

Through the dim forests of stems in this Forestry Court one perceived in the far background, in a glare of light, the russet glint and slanted outline of a bark hut. It was, indeed, a jewel house of the woods, for there were housed the gems of the forestry collection, a dazzling array of brilliant wood wares, of costly trays inlaid with Queensland timbers of rich and varied hues and grain, of cabinets and cases carved from rare products of the Queensland forests, of lustrous walking sticks in ring gidyea, plumwood, red satinay, walnut, bean, and tulip oak; of polished turnery in black ironbox and rose walnut, and what not; creations to delight the craftsman in wood and the connoisseur in timber; treasures, indeed, of the Queensland forests, and tributes to the little army of wood artists now appearing in our midst to deal adequately with them.

By contrast, alongside existed a corner in ruder wood wares, sawn board products of the Queensland Forest Service sawmills and timber yards, which seek to inculcate in the building public an appreciation of economy and efficiency in wood used in house construction. Witness "A" quality sawn hoop pine for linings, expensive stuff, indeed, and visitors were asked to compare its painted and unpainted surfaces with those of "C" quality alongside and only half its price. They were asked to regard similarly flooring pine of "B" and "C" grades side by side, half of each stained and polished, and consider the effect of the marked difference of cost. Or make the comparison odious, perhaps, for the imported wood, of selected merchantable Queensland pine for concrete work, against Oregon of similar class. Also displayed were the ordinary and the new Brennan butter box as now being turned out in thousands by the Government Forest Service band sawmill at Yarraman, which is cutting 25,000 to 30,000 superficial feet of timber a day.

In solitary state, salmon-pink, silken-rippled, and chaste, a beautiful circular occasional table stood among the cheap-grade building woods. It was a product of red satinay, of which 60,000,000 feet stand awaiting the saw in the State forests of Fraser Island. The Victorian Railways have pioneered this new cabinet wood by ordering large quantities of it for carriage panelling in place of Queensland maple silkwood. It remains now only for Queensland itself to discover it.

Service Activities.

Around the dim green walls of the Exhibition forest were hung pictures in black and white illustrative of the activities of the Queensland Government Forest Service, this industrial corporation of State timber farming and sawmilling, managers of the 5,000,000 acres of the Crown forest estates. Surveying, road-mending, logging, sawmilling, nursery work, and tree planting were among the operations photographically represented in this art gallery of the trees. Ranged in rows beneath the pictures were polished panels of some of the ornate woods of Queensland.

In a corner were massed living products of the forest nurseries, seedlings of hoop and bunya pine, of silky oak and grey teak, little green babes of the wood destined to go to the saw in thirty to fifty years' time to build the homes of our grand-children. Beside them was a motley collection of wee foreign treelings of pinus species, the pinus of the Canary Islands, of Florida, and of the Himalayas, and of California, rivals of the Queensland treelings for a place in the new man-made forests of to-morrow.

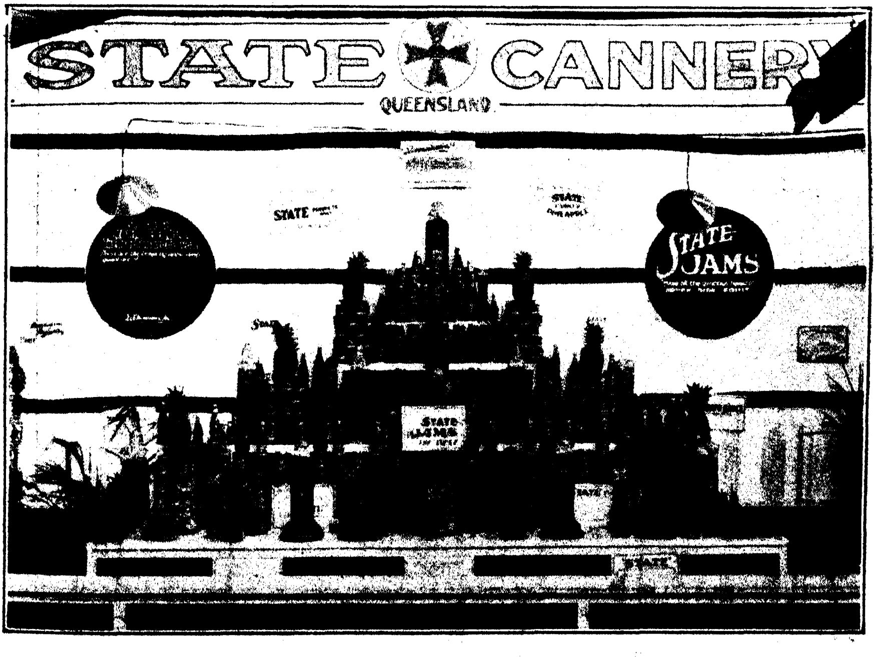


Plate 76.—This Fine Exhibit was from the State Cannery.

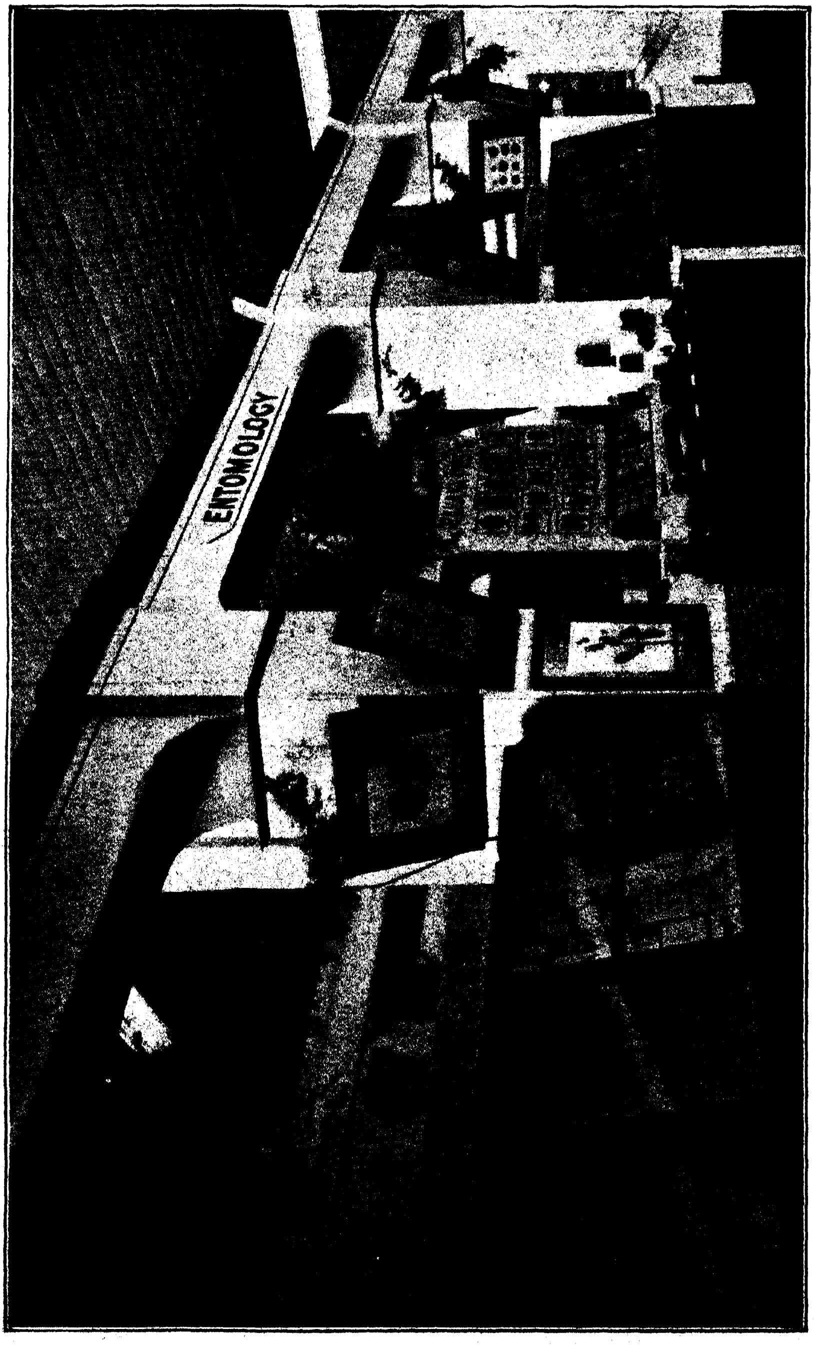


PLATE 77.—HOW QUEENSLAND FARMERS ARE SERVED BY SCIENCE. ECONOMIC ENTOMOLOGY ILLUSTRATED IN THE DEPARTMENTAL COURT.

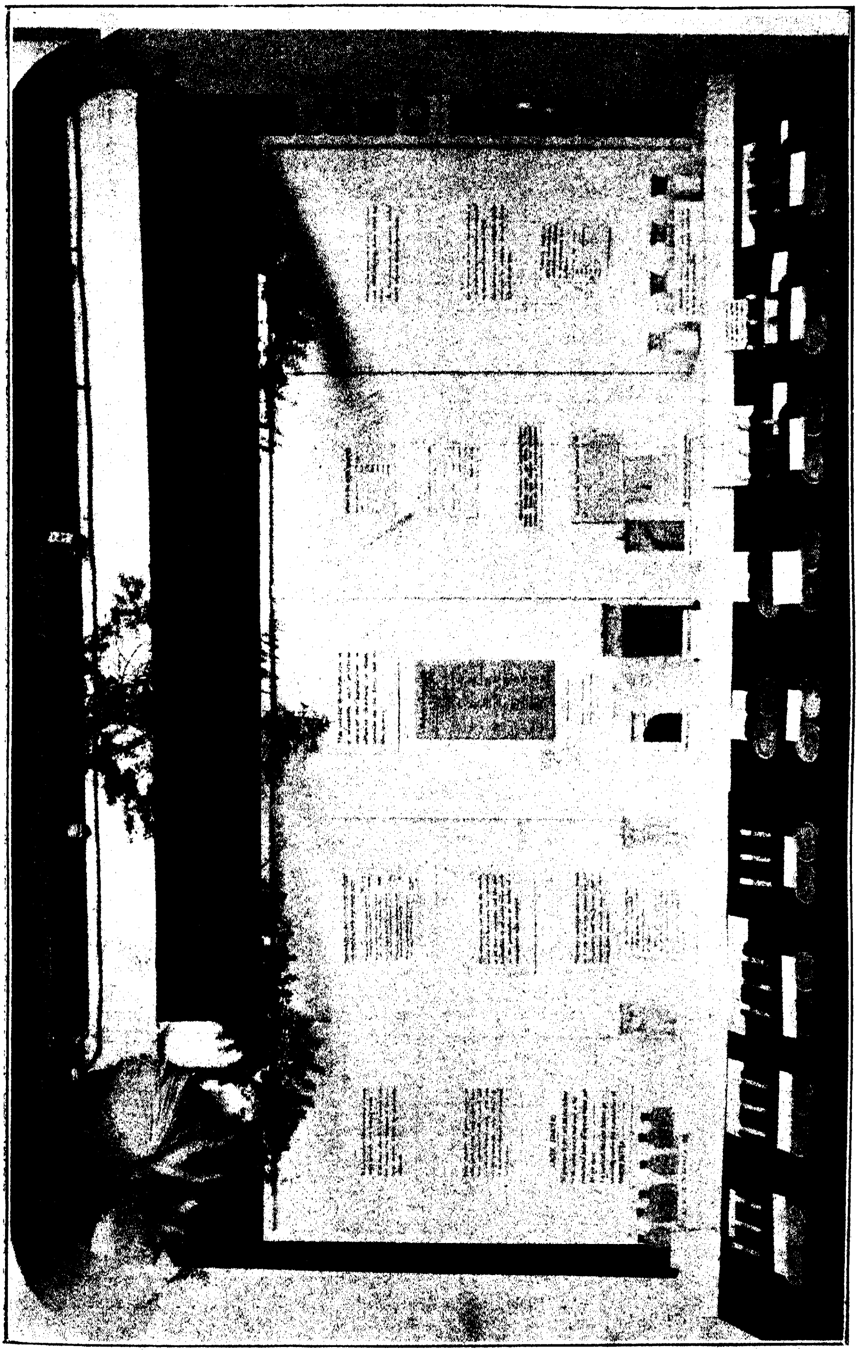


Plate 78.—Dairying Bacteriology—The National Service of Science Illustrated in the Departmental Court.

QUEENSLAND AGRICULTURAL COLLEGE.

WORK OF STUDENT FARMERS.

A practical demonstration of the students of the Queensland Agricultural High School and College was illustrative of the work done in every department of the College at Gatton.

Various fodder crops grown by the pupils occupied the centre stand in the display, and arranged between sheaves seeds raised were displayed. These included wheat, maize, barley, rye, sorghums, cowpea, and various grasses.

Numerous students at the College intend ultimately to concentrate on growing sugar-cane, and for their instruction there is a section on the farm on which numerous varieties of cane are raised. Their efforts as exhibited were worthy of commendation. Wool from merinos, crossbreds, and Corriedales, shorn at the College, was shown in profusion, and the labelling gave complete descriptions of the process of teaching young farm learners all that is essential about sheep rearing.

The Department of Agriculture has a cotton experiment station at the College, and from it was drawn some choice bolls of the Acala variety. Fodder conservation is receiving particular attention, and the demonstration was used to impress upon farmers the need for greater reservation of surplus produce in good years. Ensilage was shown stored in a model silo, a miniature of the one built at the College. Suitable types of fodder for storage also were displayed.

Cleansing Milk.

Clean milk is required in the interests of public health, and one section of the display was intended to teach dairymen how to separate small, unhealthy particles from the milk. There were on view Wisconsin sediment strainers, one showing the unused cloth and the other the quantity of dust particles cleaned from one pint of milk. These made an interesting comparison.

Various types of cream and milk cans were shown to demonstrate the necessity for using such as will not hold germs in seams. The latest type of English milk pail, rarely seen in Australia, was on the dairying stand contrasted with the popular types in use in Queensland.

Complete tuition in dairying is given at Gatton. There is a model butter factory there, and the student is enabled to proceed from instruction in milk production to the actual work of making butter. Apart from the College, milk supplies are obtained from forty-five outside dairymen, and the butter is marketed on a business basis. Several boxes of butter were on view, and in front of these were a number of cheeses made at the College. These included Edam, Cheddars, brick, and club cheese.

There was a number of interesting chemical appliances on view, including those used for the distillation of petrol and crude oils, the determination of fats in foods, and the determination of volatile fatty acids. To illustrate capillary attraction there were a number of long tubes. These showed the rate at which water rises in various types of soils.

Farm engineering was given a large space in the display. It contained models of engines, pumps, sections of farm plants, gear chains, and safety valves of bearings. The necessity for correct lubrication was eloquently shown by specimens burnt at the ends, whilst alongside are the true parts.

Tree Dentistry.

Models of silos, swingle bars, hay sheds, and feed rooms, all made by the students, were staged in the carpentry section, and close by there were samples of work done by junior pupils in the tinsmith shop. Work done in the smithy was on view, and these show that a high standard of skill has been reached by the pupils. Similarly leather work was of a high order of merit.

According to the specimens shown, tree dentistry has become a science. The filling of dangerous cavities with cement or other substances is carefully done, and correct methods in pruning and grafting were told with the aid of interesting specimens of the students' work.

Bee keeping, the extraction of honey, and the manufacture of wax, together with appliances necessary in the industry, were shown in an informative way.

In every section the College display was interesting and comprehensive, but it was robbed of much of its attractiveness by the poorness of the accommodation.

Canvas walls do not help the organisers in the difficult task of making the display attractive, and the importance of the work warrants a better domicile. Those who supervised the staging of the exhibit were Messrs. F. O. Bosworth (English master), J. W. Howie (Horticultural Instructor), and R. Keats (Dairy Instructor).

DAIRY BACTERIOLOGY.

The dairy bacteriology display in the court of the Department of Agriculture and Stock was arranged principally for the purpose of demonstrating the necessity of efficient cleansing of the various utensils used in the dairying industry, as many imperfections in dairy products—milk, cream, butter, and cheese—are associated with, and in most cases due entirely to, bacterial agency.

As a result of carefully conducted experiments, it was shown that large numbers of germs survive in milk and cream cans which have been apparently well washed and rinsed with boiling water. Milk and cream cans are only efficiently cleansed when subjected to live steam for three minutes.

Plate and tube cultures taken from rinsings from improperly cleansed milk and cream cans showed gross contamination with various micro-organisms. These were contrasted with similar plates and tubes prepared from rinsings from efficiently cleansed and sterilised cans.

One important section of the exhibit demonstrated that milk in the cow's udder is germ free, and only becomes contaminated after it is drawn. By adopting precautionary measures it is possible to obtain from the cow germ-free milk which will keep indefinitely at any temperature. To illustrate this, samples of milk had been drawn with precautionary measures direct from the cow into sterilised receptacles in May and July last, and were still perfectly sweet, while samples drawn on 7th August without precautionary measures directly into unsterilised receptacles had turned sour.

Micro-Organisms.

Cultures of micro-organisms isolated from contaminated milk and cream are capable of producing: (1) Ropiness in milk and cream; (2) a tallowy taste in butter; (3) sponginess and gas formation in cheese. Organisms which are found in contaminated water, and are likely to produce faults in dairy produce, were exhibited. There were also shown various moulds and colour and unpleasant odour producing bacteria which have been found associated with dairy products.

Pure lactic starters for the ripening of cream in the manufacture of butter, the more general use of which must result in the production of improved flavour and aroma, had a place in the exhibit.

The practical benefits of pasteurisation applied to cream and milk demonstrated that practically all bacteria which otherwise may produce unpleasant flavour, aroma, &c., are destroyed. Details of a simple method of home pasterisation also were clearly set out.

The causative organism of contagious mammitis (streptococcal) was shown growing in artificial media, and the methods of controlling the disease by hygiene and vaccine treatment were described.

YOUNG JUDGES—TESTS AT THE SHOW.

Organised by Mr. P. Frankel (Royal National Association Vice-President), the young judges' competitions now form an important and popular section of the Royal National Show. They are not only creating more interest and keener competition each year among the young farmers and intending farmers of the State, but the standard of the work of the competitors is much higher.

The classes this year provided for the judging of Clydesdale stallions, Shorthorn bulls, Hereford bulls, Ayrshires, Jerseys, Illawarra Milking Shorthorns, Friesians, Guernseys, Berkshire boars, and Tamworth boars. All classes were open to persons not over twenty-five years of age, including students attending Agricultural Colleges, young farmers, and farmers' sons. Winners of judging competitions at any previous Royal National Show were not eligible to compete in similar classes at this or future Shows.

The entries in each section were exceptionally good, particularly in the Illawarra Milking Shorthorn class, for which there were no fewer than eighteen competitors as

PLATE 79.—BETTER COWS ON THE FARM IS THE OBJECT OF THE DEPARTMENTAL HERD TESTING SCHEME. Concrete results are evident in this display of High-class Dairy Products, a distinctive feature of the Court.

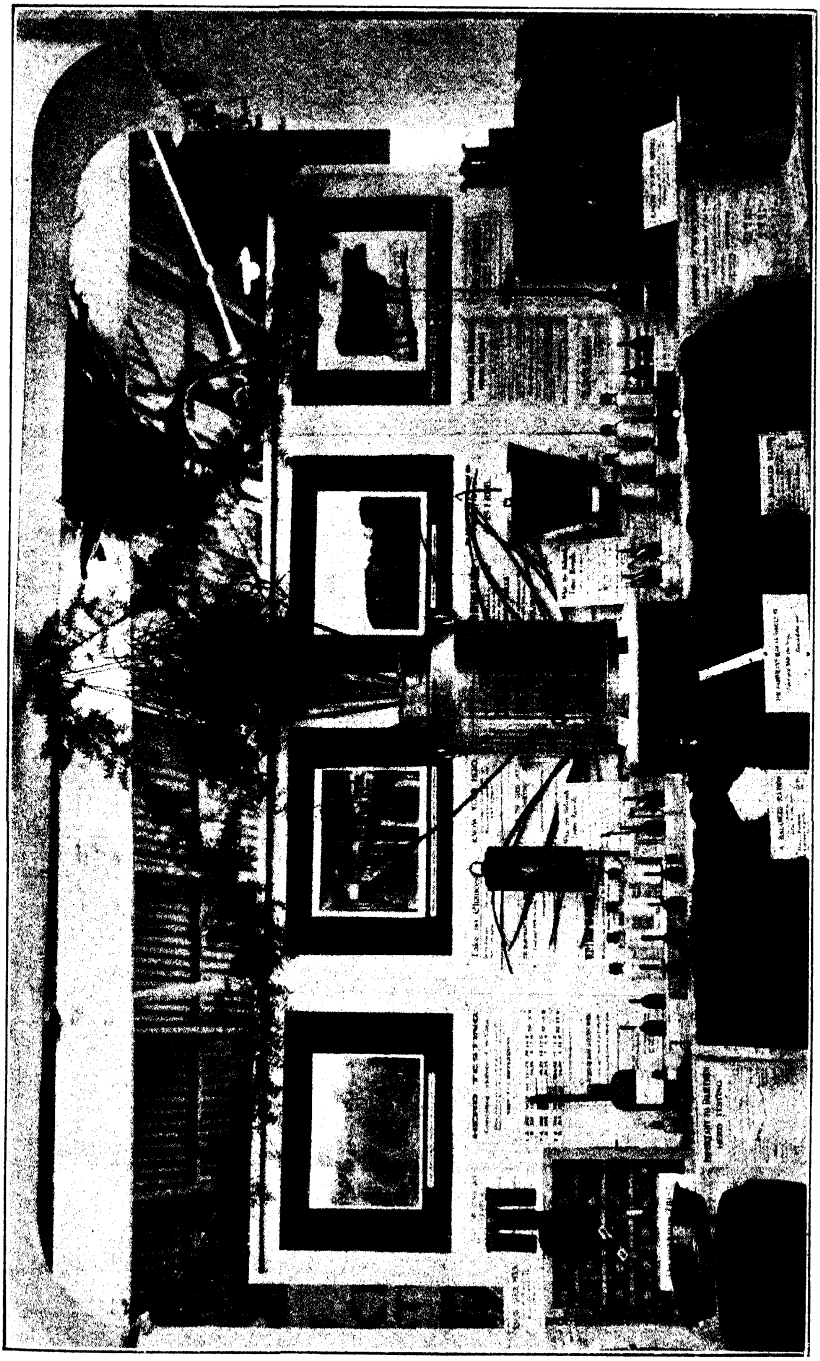


PLATE 80.—THE COW AND THE PLOUGH.

Their importance to the nation was demonstrated in this striking exhibit in the Departmental Court. The Dairying Industry is now worth six and a half millions sterling to Queensland annually.

compared with eleven last year. The entrants in each class included several students from the Queensland Agricultural College, Gatton, where the value of actual judging and handling of the animal by each student is fully recognised.

Seven young men took part in the judging of Shorthorn bulls. With two exceptions the competitors were students from the Queensland Agricultural College. The judge, Mr. G. B. Waller, of Wallarobba, New South Wales, had selected three young bulls, and the competitors, who were required to place the beasts in their order of merit and also state their reasons for so doing, were allowed fifteen minutes in which to carry out their task.

Keen Competition.

The competition was remarkably keen throughout, and a subsequent examination of the papers showed that they were exceptionally good, the difference between the first four papers being very small. C. Tilley, of Gatton College, was the winner, with R. P. Hughes, Hendon, and Reg. A. Price, Gatton College, equal for second place.

In announcing the results, Mr. Waller congratulated the lads on their good work, remarking that the papers showed that they evidently had a proper grasp of their subject. Some of the competitors, however, had made the mistake of giving rather too much prominence to details that were not essential. They must always remember to take into consideration the main features of the animal—viz., the character, lines, and flesh. He also recommended the young judges to depend on their fingers, and not their eyes, in judging cattle. Their eyes might deceive them in the finer points of an animal, but their fingers never would.

Mr. Waller explained in detail his reasons for placing the animals in their respective places, and highly complimented T. Graham, of Gatton College, on his fine description of each beast.

HORTICULTURE.

The Horticultural Pavilion at this year's Royal Show was again a beauty spot, where a wonderful wealth of blooms greeted the eye. A special feature was an excellent exhibition of sweet peas, a long stand, running the whole length of the pavilion, being occupied by these beautiful, vari-coloured winter blooms. The entry in the sweet pea class was very satisfactory, and the judge (Mr. F. Phillips) had a difficult task set him. He said that the peas were of a very high standard this year, which was incidental to Queensland, this State possessing the ideal climate for the growth of winter-flowering sweet peas. Many new varieties were shown, and they compared very favourably with some of the older varieties, all combining to make a fine centrepiece in an admirable collection of choice products of the home garden.

The colours of many of the sweet peas this year were uncommon, showing that growers of this choice winter flower are ever on the alert for new varieties. The rose exhibits were also excellent, and an improvement on last year's display, and better than was anticipated, considering the unfavourable weather. As a matter of fact, the quality of the roses all round was superior to any shown at the Brisbane Exhibition for the past three years. The several classes were also well filled, considering that the entries had to be in so early. The outstanding roses were a Frau Karl Druschki, exhibited by Mrs. Proctor; a George Dickson, a Rhea Reid, and a Mrs. Herbert Stephens (the latter three being exhibited by Mrs. J. Willis). The other classes of cut flowers made a fine showing and the novice classes were well filled. A very fine non-competitive display of pot plants, ferns, and flowers, &c., was staged by Mr. M. G. Rose, of Northgate Nurseries, the exhibit being well arranged, and of a most comprehensive character. In the class for pot plants there was unfortunately little competition, one exhibitor (Mr. Henry Jarrett) taking the bulk of the first prizes.

The Horticultural Society's competition, open to suburban and country competitors, which should draw a good entry, was unfortunately not a success in this connection, Toowong's being the only entry received, and it was an admirable exhibit, nicely arranged, and reflected great credit on the growers who participated in the collective exhibit. The Horticultural Society's competition is certainly worthy of better patronage, and it is hoped that next year a more satisfactory entry will be forthcoming, as this class provides plenty of scope for the individual exhibitor to make a name for his particular locality by contributing to a collective exhibit. The display in the Horticultural Pavilion at the Brisbane National Show is improving every year, and the question of providing more accommodation for the horticultural classes will soon arise.

PLATE 81.—THE QUEENSLAND BOY AND HIS INDUSTRY.

The work of the Rural Schools in its wide range and practical efficiency formed one of the most attractive exhibits at this year's Show.

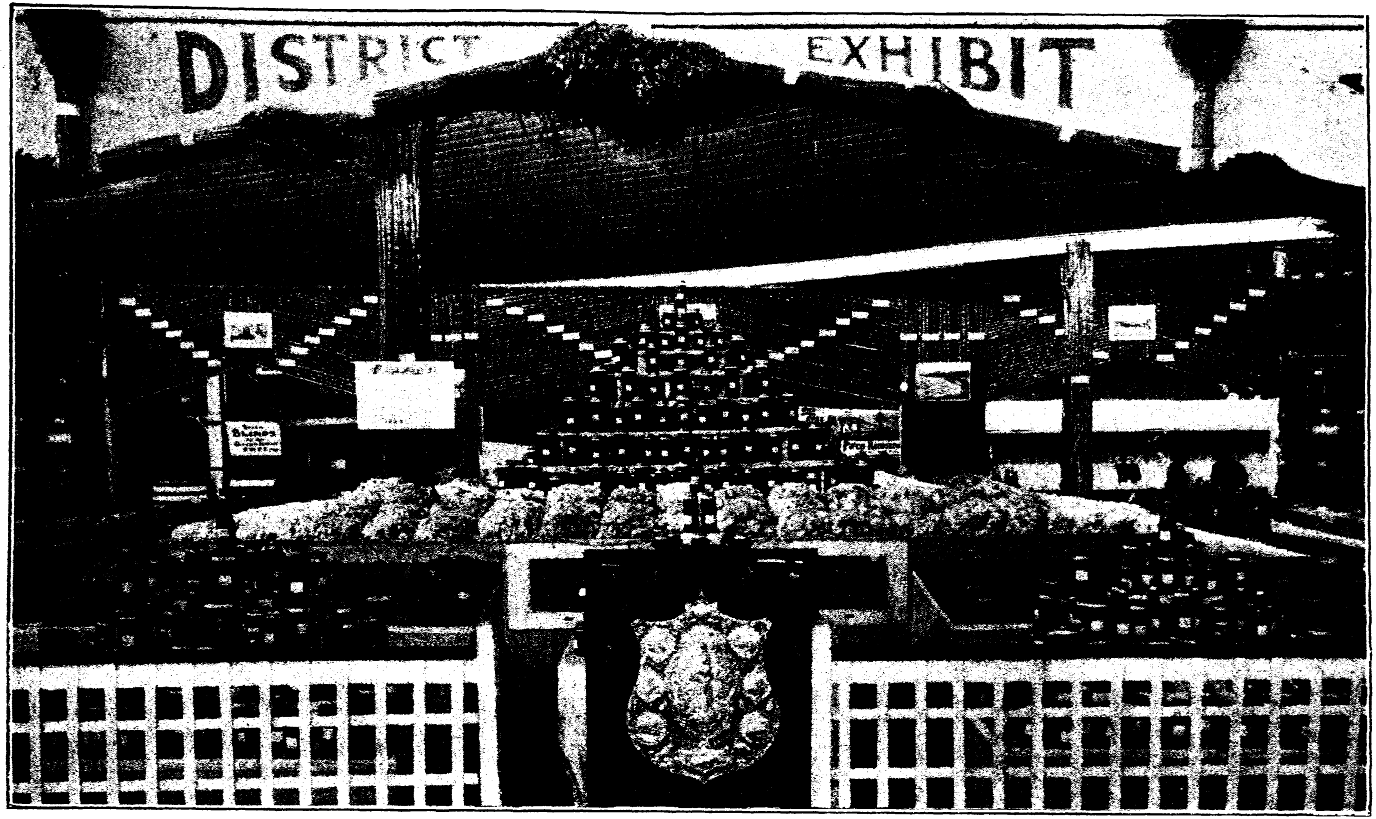


PLATE 82.—THE WINNING DISPLAY IN "A" GRADE DISTRICT COMPETITIONS. THE EXHIBIT FROM THE NORTH COAST DISTRICT OF NEW SOUTH WALES.

THE AWARDS.

DISTRICT EXHIBITS.

A GRADE.

The winning honours in the coveted Chelmsford Shield in the competition for District Exhibits of primary products and manufactures at this year's Exhibition were awarded to the magnificent display from the North Coast and Tableland of New South Wales. Its grand aggregate of points was 1,223 out of a possible aggregate of 1,572. The Wide Bay and Burnett District was second in the aggregate with 1,181 points. Details:—

—	Possible Points.	Wide Bad and Burnett District	North Coast and Tablelands of N.S.W.	South Coast of Queensland.
Dairy Produce—				
Butter, 1 box, 56 lb.	90	84½	85½	85½
Milk (condensed, concentrated, or dried), and by-products	40	10	38	5
Cheese, not less than 1 cwt.	60	48	50	45
Eggs, 1 dozen	20	14	10	16
Totals	210	156½	183½	151½
Foods—				
Hams and bacon	50	46	40	47
Rolled and smoked beef and mutton	20	15	..	18
Smallgoods and sausages, if smoked or preserved	10	8	6	9
Fish—Smoked, preserved, or canned,	10	7	6	6
Canned meats	25	10	15	20
Lard, tallow, and animal oils	20	18	12	14
All butcher's by-products	10	8	7	8
Honey, and by-products thereof	20	17	18	13
Confectionery, factory made	10	3	4	5
Bread, scones, biscuits, and cakes—factory made	10	5	5	7
Totals	185	137	113	147
Fruits, Vegetables, and Roots—Fresh and Preserved—				
Fresh fruit—all kinds	60	57	46	52
Preserved fruits, jams and jellies	30	22	28	22
Crystallised and dried fruits	20	10	18	..
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes	25	18	20	17
Preserved and dried vegetables, pickles, sauces	10	8	10	8
Potatoes, English and sweet	40	30	35	26
Roots (*see* reg. 4), all kinds and their products, including meals (1 lb. each) arrowroot, cassava, &c.	14	12	7	10
Cocoanuts, peanuts, and other nuts	10	6	8	3
Totals	209	163	172	138

DISTRICT EXHIBITS (A GRADE)—*continued.*

—	Possible points.	Wide Bay and Burnett District	North Coast and Tablelands of N.S.W.	South Coast of Queensland.
GRAIN, ETC.—				
Wheat	50	30	47	28
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	9	6	8
Maize, 3 cobs, and ¼ bushel of each variety	50	38	45	32
Maizena, meals, starch, glucose, and cornflour	10	6	5	5
Oats, rye, barley, malt, pearl barley, and their meals	30	20	27	20
Totals	150	103	130	93
MANUFACTURES AND TRADES—				
All woodwork	30	27	18	15
All metal and ironwork	30	25	20	28
Leather and all leather work and tanning	20	16	20	19
Manufactured woollen and cotton fibre	30	15	25	20
All tinwork	10	7	8	10
Artificial manures	10	6	2	9
Brooms and brushes	10	3	6	8
Manufactures not otherwise enumerated	15	14	13	15
Totals	155	113	112	124
MINERALS AND BUILDING MATERIALS—				
Gold, silver, copper, and precious stones	25	20	11	7
Coal, iron, other minerals, and salt	30	22	9	9
Stone, bricks, cement, marble, terra-cotta	20	10	10	15
Woods—Dressed, undressed, and polished	25	22	23	22
Totals	100	74	53	53
TROPICAL PRODUCTS—				
Sugar-cane	60	53	55	40
Sugar, raw and refined	20	12	12	8
Rum, other spirits and by-products	10	10	8	9
Coffee (raw and manufactured), tea, and spices	10	6	5	3
Cotton (raw) and by-products	30	20	20	25
Rubber	10	10	..	..
Oils (vegetable)	10	10	10	..
Totals	150	121	110	85
WINES, ETC.—				
Wines	15	8	9	5
Aerated and mineral spa water, vinegar, and cordials	10	6½	7	6
Ales and stout	10	7	..	..
Totals	35	21½	16	11
TOBACCO—				
Tobacco (cigar and pipe), in leaf	20	10	15	15

DISTRICT EXHIBITS (A GRADE)—*continued.*

——	Possible Points.	Wide Bay and Burnett District	North Coast and Tablelands of N.S.W.	South Coast of Queensland
HAY, CHAFF, ETC.—				
Hay—Oaten, wheaten, lucerne, and other varieties	30	17	29	15
Grasses and their seeds	10	6	9	5
Chaff—Oaten, wheaten, lucerne, and other varieties	50	36	42	36
Ensilage and other prepared cattle fodder	20	15	8	8
Sorghums and millets, in stalk	10	8	7	5
Commercial fibres (raw and manufactured)	10	6	9	8
Pumpkins and other green fodder	10	6	8	7
Broom millet, ready for manufacture	10	8	6	4
Farm seeds, including canary seed	13	10	11	8
Totals	163	112	129	96
WOOL, ETC.—				
Scoured wool	40	37	40	37
Greasy wool	60	50	60	47
Mohair	10	8	7	7
	110	95	107	91
ENLARGED PHOTOGRAPHS	5	3	5	2
EFFECTIVE ARRANGEMENT—				
Comprehensiveness of view	20	19	19	16
Arrangement of sectional stands	25	22	24	19
Effective ticketing	10	9	10	8
General finish	25	22	24½	19
Totals	80	72	77½	62
Grand Totals	1,572	1,181	1,223	1068½

B GRADE.

In the very fine competition for Primary Products Only, the Brisbane Valley, which won the same competition in 1926, followed up that success with another first on this occasion. The runners-up were the Northern Darling Downs, who were in a similar position in 1926. Kingaroy exhibit was a meritorious third with an aggregate of 912 points. In the detailed points it is interesting to note that while Brisbane Valley and Northern Darling Downs went back in points on their 1926 figures, Kingaroy improved theirs. This will be better noted by a comparison of the figures of the two years of those three exhibits. They were, with 1926 in parenthesis, as follows:—Brisbane Valley 1,030½ (1,089½); Northern Darling Downs, 926 (964); Kingaroy, 912 (891). In the sectional points, some of the contests were very close. For instance, in Dairy Produce, there was only 13½ points difference between the first and the last of the five exhibits. Again, in the Food Section, the points awarded varied from 72 to 96. In some of the other sections there were similar keen contests. The detailed points are as follows:—

——	Possible points.	Nanango District.	Oakey District.	Northern D.D. District.	Brisbane Valley District.	Kingaroy District.
DAIRY PRODUCE—						
Butter, one box, 56 lb.	90	83	84	84½	84	84
Cheese, not less than 1 cwt.	60	52	55	60	53	50
Eggs (suitable for domestic use)	20	12	12	16	18	17
Totals	170	147	151	160½	155	151

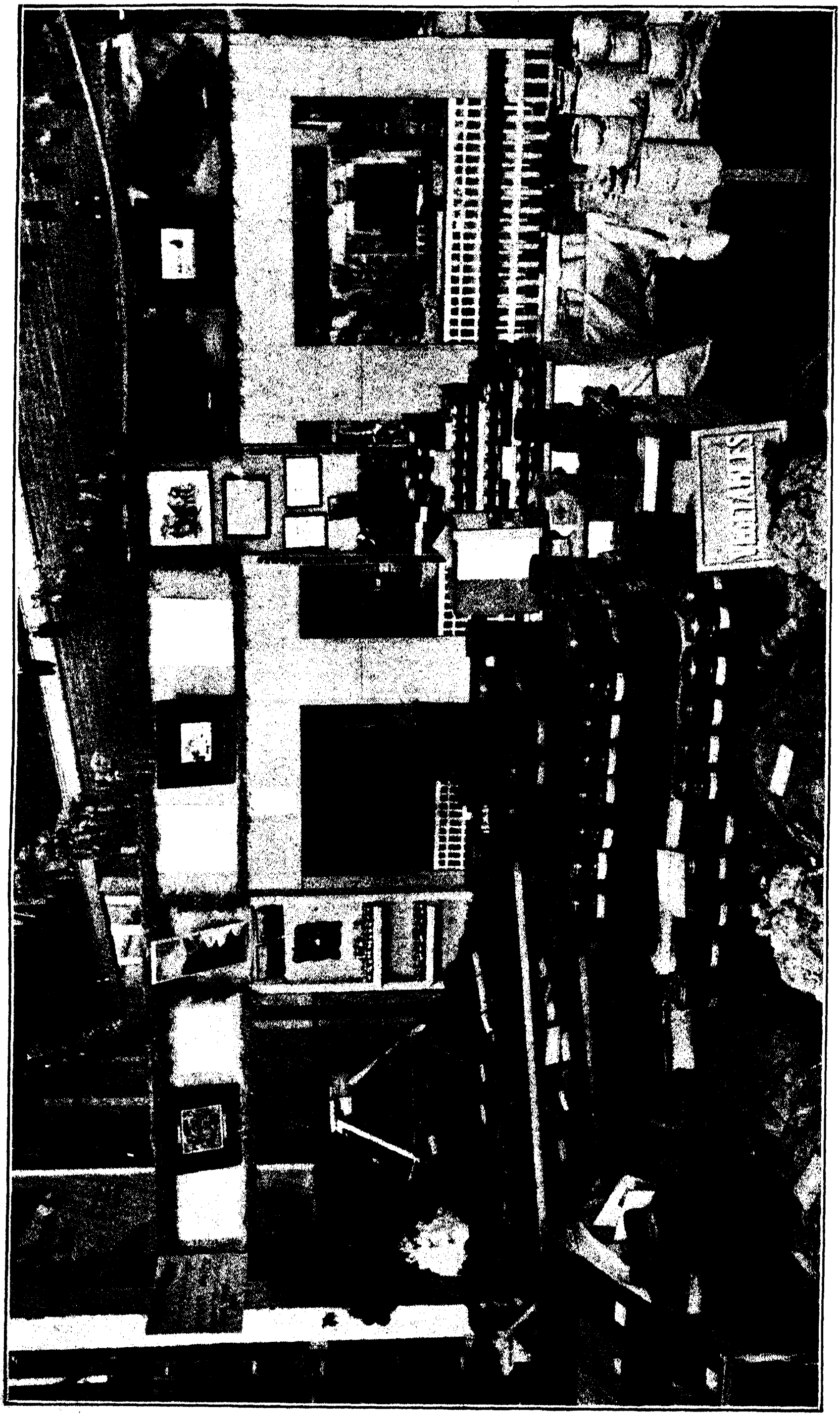


PLATE 83.—THE WINNING DISPLAY IN "B" GRADE DISTRICT COMPETITIONS—EXHIBIT FROM THE BRISBANE VALLEY.

DISTRICT EXHIBITS (B Grade)—*continued.*

	Possible Points.	Nanango District.	Oakey District.	Northern D.D. District.	Brisbane Valley District.	Kingaroy District.
Foods—						
Hams, bacon, rolled and smoked beef and mutton	50	35	36	41	40	42
Fish, smoked	10	..	5	4	5	4
Lard, tallow, and animal oils	20	15	15	15	18	17
Honey and by-products thereof	20	15	8	14	18	14
Confectionery (home made)	10	3	3	2	6	2
Biscuits, bread, cakes, and scones (home made)	10	6	5	8	9	7
Totals	120	74	72	84	96	86
Fruits, Vegetables, and Roots (Fresh and Preserved)—						
Fresh fruits, all kinds	60	30	30	52	57	50
Preserved fruits, jams, and jellies (home made)	30	20	20	23	26	20
Crystallised and dried fruits (home made or dried)	20	8	..	16	12	10
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes	25	16	14	18	20	16
Preserved and dried vegetables, pickles, sauces, home made or dried	10	5	6	8	9	7
Potatoes, English and sweet	40	30	22	24	33	32
Roots, all kinds, and their products, including meals, arrowroot, cassava, &c.	14	6	..	5	8	11
Cocoanuts, peanuts, and other nuts	10	4	3	3	7	8
Vegetable seeds	10	6	6	4	6	8
Totals	219	125	101	153	178	162
Grain, Etc.—						
Wheat	50	38	32	40	36	33
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	7	9	7	2	6
Maize	50	44	28	32	45	46
Maizena, meals, starch, glucose, and cornflour	10	3	2	5	3	5
Oats, rye, barley, rice, malt, pearl barley, and their meals	30	18	12	23	22	20
Totals	150	110	83	107	108	110
Woods—						
Woods, dressed, undressed, and polished	25	21	20	20	22	23
Wattle bark	15	12	10	10	14	12
Totals	40	33	30	30	36	35
Hides, and Home-preserved Skins (for Domestic use)	15	15	5	12	15	10
Tropical Products—						
Sugar-cane	60	10	..	9	20	15
Coffee, tea, and spices	10	8	..	5	8	7
Cotton (raw) and by-products	30	20	12	20	20	15
Totals	100	38	12	34	48	37

DISTRICT EXHIBITS (B GRADE)—*continued.*

—	Possible points.	Nanango District.	Oakey District.	Northern D.D. District.	Brisbane Valley District.	Kingaroy District.
MINERALS—						
Gold, silver, copper, and precious stones	25	11	2	6	13	12
Coal, iron, and other minerals and salt	30	13	10	12	14	12
Totals	55	24	12	18	27	24
TOBACCO—						
Tobacco, cigar and pipe, in leaf ..	20	12	8	12	12	10
HAY, CHAFF, ETC.—						
Hay—Oaten, wheaten, lucerne, and other varieties	30	21	20	22	27	20
Grasses and their seeds	10	8	7	9	8	7
Chaff—Oaten, wheaten, lucerne, and other varieties	50	40	22	35	44	30
Ensilage and other prepared cattle fodder	20	14	..	8	16	10
Sorghums and millets, in stalk ..	10	9	6	8	9	8
Commercial fibres, hemp, and flax ..	15	4	..	8	12	10
Pumpkins and other green fodder ..	10	9	9	7	8	7
Broom millet, ready for manufacture	10	9	6	9	9	9
Farm seeds, including canary seed ..	13	6	6	8	8	8
Totals	168	120	76	114	141	109
WOOL, ETC.—						
Scoured wool	40	37	37	35	36	36
Greasy wool	60	49	50	59	50	48
Mohair	10	9	..	9	7	7
Totals	110	95	87	103	93	91
ENLARGED PHOTOGRAPHS	5	3	2	3	5	2
LADIES' AND SCHOOLS' WORK, AND FINE ARTS—						
Needlework and knitting	25	15	10	16	22	12
School needlework by pupils of schools in the district	5	3½	2	3½	4½	2
Fine arts	5	3	2	5	5	5
School work, maps, writing, &c., by pupils in the district	10	8	4	9	8	8
Totals	45	29½	18	33½	39½	27
GENERAL POINTS—						
Effective arrangement, comprehensiveness of view	20	18	15	18	19	16
Arrangement of sectional stands ..	25	21	15	17	24	16
Effective ticketing	10	8	6	8	10	8
General finish	25	22	16	19	24	18
Totals	80	69	52	62	77	58
Grand Totals	1,927	894½	709	926	1,030½	912

ONE-MAN FARM.

EIGHT FINE DISPLAYS.

The one-man farm exhibit contest at this year's Exhibition was productive of eight magnificent displays; a record for this section. Pride of place was awarded to Mr. H. Franke, who secured 473 points, with Mr. J. Beek a very good second, with 445½ points. The competition was very keen. Details of the awards are:—

—	Possible Points.	H. Franke.	E. J. Rossow.	W. D. Ponton.	L. D. Christensen.	J. T. Whiteway.	J. Longes.	W. Brumpton.	J. Beek.
DAIRY PRODUCE—									
Butter, 6 lb.	25	17½	17	16½	18½	17½	18	17	19
Cheese, 1 large (10 lb.), or 2 small (5 lb.) each, home made	20	16	5	12	14	16	3	10	..
Eggs of domestic fowl ..	5	4	2	4	2	4	2	2	5
Totals	50	37½	24	32½	34½	37½	23	29	24
FOODS—									
Hams (15 lb.), bacon (15 lb.), home-cured ..	20	16	18	15	17	18	17	15	15
Corned, smoked, and spiced beef and mutton, 10 lb.	10	8	6	8	8	7	7	7	8
Honey, any variety, and by-products thereof ..	15	7	3	14	3	6	2	3	6
Beeswax, 6 lb.	5	3	2	4	2	2	1	2	2
Bread (2 loaves), and scones (1 dozen) ..	5	2	2	2	2	3	3	3	3
Confectionery and sweets, 3 lb.	5	3	1	2	1	3	2	1	1
Home cookery, including cakes, biscuits, and other foods	7	4	3	1	2	4	1	4	2
Lard, tallow, and animal oils	5	4	4	4	5	5	3	3	4
Totals	72	47	39	50	40	48	36	38	41
FRUITS, VEGETABLES, AND ROOTS (fresh and preserved)—									
Fresh fruits, all kinds ..	25	20	18	21	15	22	10	10	17
Crystallised and dried fruits	10	8	9	9	5	8	6	5	..
Preserved fruits, jams, and jellies	15	12	13	13	10	13	9	10	12
Fresh vegetables ..	15	13	8	7	8	11	6	5	9
Pickles and sauces ..	15	13	12	13	8	13	7	8	10
Potatoes and roots ..	25	22	17	16	16	10	11	10	23
Table pumpkins, squashes, and marrows, 56 lb. ..	10	7	8	7	7	7	6	6	8
Cocoanuts and nuts ..	7	3	3	3	5	6	3	5	3
Vegetable and garden seeds	5	4	4	5	4	4	4	3	..
Arrowroot, 10 lb. ..	5	4	5	4	5	5	..	3	4
Sugar beet, 3 lb. ..	5	5	..	..	5	..	5	5	..
Cassava, 3 lb.	5	..	5	5	5	5	..	..	5
Ginger, 3 lb.	5	..	..	3	..	5	2	..	..
Totals	147	111	102	106	93	109	69	70	91

PLATE 84.—MR. H. FRANKE'S FINE WINNING EXHIBIT IN THE "ONE-MAN FARM" COMPETITION.

ONE-MAN FARM—*continued.*

—	Possible Points.	H. Franke.	E. J. Rossow.	W. D. Ponton.	L. D. Christensen.	J. T. Whiteway.	J. Donges.	W. Brumpton.	J. Beck.
GRAIN, ETC.— ..									
Wheat	25	24	12	15	22	3	6	24	13
Maize	25	25	18	20	20	16	12	8	24
Barley, oats, rye, and rice	20	17	6	17	12	7	4	12	18
Home-made meals from above varieties of grain	10	8	10	8	8	9	7	10	9
Totals	80	74	46	60	62	38	29	54	64
TROPICAL PRODUCTS—									
Sugar-cane, 24 stalks or 1 stool	30	3	6	2	15	16	..	2	20
Cotton, in seed	20	10	15	12	12	15	15	12	15
Coffee	5	..	..	..	3	5	..	..	3
Totals	55	13	21	14	30	36	15	14	38
TOBACCO—									
Tobacco, leaf, dried ..	10	8	5	9	8	5	..	4	6
HAY, CHAFF, ETC.—									
Hay—Oaten, wheaten, lucerne, and other varieties	20	13	9	9	15	6	11	8	17
Grasses and their seeds, including canary ..	10	4	5	7	7	6	6	1	7
Chaff—Oaten, wheaten, lucerne, and other varieties	20	20	13	4	15	7	14	10	18
Ensilage, any form ..	15	7	6	3	6	6	4	2	15
Cattle fodder (pumpkins and green fodder) ..	15	14	8	10	9	6	10	7	10
Sorghum and millet (in stalk)	10	9	10	6	6	4	5	4	7
Broom millet, 10 lb. ..	10	6	7	8	8	6	2	8	10
Cowpea, seed, 7 lb. ..	7	6	6	3	7	3	3	3	5
Flax, 3 lb., and hemp, 3 lb.	5	4	2	4	4	4	..	3	4
Totals	112	83	66	54	77	48	55	46	93
WOOL—									
Greasy, 3 fleeces	20	16	15	18	18	17	15	20	17
Mohair	5	4	5	3	..	4	3	4	4
Totals	25	20	20	21	18	21	18	24	21
DRINKS, ETC.—									
Temperance drinks, 6 bots.	10	7	6½	5	7	7	4½	6½	7
WOMEN'S AND CHILDREN'S WORK—									
Needlework and knitting	10	5	4	6	7	9	3	9	5
Fine arts	5	2	..	3	1	4	2	1	1
Fancy work	15	6	7	3	8	10	4	11	8
School work, maps, writing, &c.	5	4	4	3	..	2	4	2	2
School needlework ..	5	1	2	1	..	4	3	..	4
Totals	40	18	17	16	16	29	16	23	20

ONE-MAN FARM—*continued.*

—	Possible Points.	H. Franke.	E. J. Rossow.	W. D. Ponton.	L. D. Christensen.	J. T. Whiteway.	J. Donges.	W. Brampton.	J. Beck.
MISCELLANEOUS—									
Articles of commercial value	5	5	5	5	4	5	3	4	5
PLANTS AND FLOWERS IN POTS	5	5	2	4	..	5	4	3	..
TIME AND LABOUR-SAVING USEFUL ARTICLES—									
Made on the farm ..	10	7	6	..	9	9	8	9	..
EFFECTIVE ARRANGEMENT OF EXHIBITS—									
Comprehensiveness of view	10	9	6½	8	9	6½	8½	7½	9
Arrangement of stands ..	10	10	7	9½	8	7½	6½	7	9
Effective ticketing ..	5	4	3	4½	3½	4	3	2½	4½
General finish	15	14½	11	14½	13½	11½	9	10½	13
Totals	40	37½	27½	36½	34	29½	27	27½	35½
Grand Totals ..	661	473	387	413	432½	424	307½	352	445½

TROPICAL PRODUCTS.

NORTH QUEENSLAND'S FINE EXHIBIT.

Although there was only one exhibit in the Tropical Products District competition, that of North Queensland, this was awarded a very high percentage of points, and is one of the interesting features of the District Exhibit Section. Details:—

—	Possible Points.	Northern Queensland.
DAIRY PRODUCE—		
Butter, 1 box, 56 lb.	90	82
Milk (in any form), cream	10	..
Cheese, 1 cwt.	60	50
Eggs (suitable for domestic use)	20	14
Totals	180	146
FOODS—		
Hams, bacon, rolled and smoked beef and mutton ..	50	42
Smallgoods and sausages	5	3
Canned meats	25	22
Fish—smoked, preserved, or canned	10	8
Lard, tallow, and animal oils	20	15
All butchers' by-products	10	5
Honey and by-products thereof	20	12
Confectionery	10	3
Biscuits, bread, cakes, and scones	10	6
Totals	160	116

TROPICAL PRODUCTS—*continued.*

—	Possible Points.	Northern Queensland.
Fruit, Vegetables, and Roots—		
Fresh and preserved, fresh fruits, all kinds	60	52
Preserved fruits, jams, jellies	20	16
Crystallised and dried fruits	20	14
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes	25	15
Preserved and dried vegetables, pickles, and sauces ..	10	8
Potatoes, English and sweet	40	34
Roots, all kinds, and their products, including meals, arrowroot, cassava, &c.	14	9
Cocoanuts, peanuts, and other nuts	10	7
Vegetable seeds	10	..
Totals	209	155
Grain—		
Maize, in cob	25	15
Maize, shelled	25	16
Rice and other cereals and their meals	15	10
Totals	65	41
Minerals and Building Materials—		
Gold, silver, copper, and precious stones	25	14
Coal, iron, and other minerals, and salt	30	14
Stone, bricks, cement, marble, terra-cotta	20	12
Woods, dressed, undressed, and polished	25	24
Totals	100	64
Tropical Products—		
Sugar-cane	60	56
Sugar, raw and refined)	20	14
Rum, other spirits and by-products	10	5
Coffee (raw and manufactured), tea, spices, and essences ..	10	8
Cotton (raw) and by-products	30	15
Rubber	10	8
Oils (medical and machinery)	15	..
Tropical products, not elsewhere enumerated	15	..
Totals	170	106
Wines, Etc.—		
Wines	15	4
Vinegar, cordials, aerated, and mineral spa waters.. ..	10	7
Ales and stout	10	8
Totals	35	19
Tobacco, Etc.—		
Tobacco (raw)	20	15
Cigars, cigarettes, and snuff	10	..
Totals	30	15

TROPICAL PRODUCTS—*continued.*

——	Possible Points.	Northern Queensland.
HAY, CHAFF, ETC.—		
Hay—Oaten, wheaten, lucerne, other varieties	30	18
Grasses and their seeds	10	6
Chaff—Oaten, wheaten, lucerne, and other varieties ..	50	20
Ensilage and other prepared cattle fodder	20	10
Sorghums and millets, in stalk	10	7
Commercial fibres, hemp, and flax	15	2
Pumpkins and other green fodder	10	6
Broom millet, ready for manufacture	10	4
Farm seeds, including canary seed	12	7
Totals	168	80
WOOL, ETC.—		
Scoured wool	40	38
Greasy wool	60	59
Mohair	10	8
Totals	110	105
MISCELLANEOUS PRODUCTS OF COMMERCIAL VALUE—		
Wattle bark	15	12
Preserved skins	15	10
Marine shells	15	15
Tropical plants and foliage	10	5
Total	55	42
LADIES' AND SCHOOLS' WORK AND FINE ARTS—		
Needlework and knitting	25	20
Essay by pupil of school in district on "Value of Agriculture and Dairying"; to be judged for writing and composition	10	9
Fine arts	5	2
School work, maps, writing, &c., by pupils of school in district	5	5
School needlework by pupils of schools in district	5	1
Totals	50	37
ENLARGED PHOTOGRAPHS	5	3
EFFECTIVE ARRANGEMENT—		
Comprehensiveness of view	20	18
Arrangement of sectional stands	25	18
Effective ticketing	10	6
General finish	25	16
Totals	80	58
Grand Totals	1,417	987

Buy

RELIABLE TYPEWRITERS

from a

RELIABLE FIRM.

We are Sole Agents for—

L. C. SMITH silent ball-bearing Typewriters
CORONA - - Portable Typewriters
GESTETNER - All British Duplicators
DALTON - - Adding Machines
MARCHANT - Calculating Machines

WE also have a large stock of second-hand Typewriters of all makes, thoroughly reliable, fully guaranteed, and at prices from £5 to £20. Terms from £1 deposit and £1 monthly can be arranged to suit clients. Everything we sell is fully guaranteed. Write for particulars.

ESTABLISHED 1903

MACDOUGALLS LTD.

(formerly Australian Typewriter Supplies Co.)

363-365 Queen Street

Box 345 **BRISBANE** *'Phone: 717-718*

Insure with the

Royal
Insurance
Coy., Ltd.

FUNDS EXCEED £35,790,927.

FIRE DEPARTMENT.

Fire Risks of all kinds accepted. Loss or damage by Lightning, Gas Explosion, and Bush Fires included. Loss of Profits also accepted.

ACCIDENT DEPARTMENT.

Personal Accident and Sickness, Public Risk, Plate Glass, Burglary and Fidelity Guarantee Insurances accepted at lowest current rates.

Be wise to-day and take out a Royal "Paragon" Accident and Sickness Policy (covering 32 sicknesses).

MARINE COVERS GRANTED.

Queensland Branch
Royal Insurance Buildings,
355-357 Queen St., Brisbane.
GEO. L. EVES, Manager for Queensland.

BRUNNING
BEST FOR BEARING
FRUIT TREES
(True to Name and Healthy)

are planted throughout Australasia. Apples, Pears, Plums, Peaches, Nectarines, Quinces, Mulberries, Oranges, Lemons, etc.

Shipments made to all Parts of the World.

JOHN BRUNNING & SONS
Established 60 Years
SOMERVILLE NURSERIES
SOMERVILLE, VICTORIA, AUSTRALIA

A Complete Service in Fertilisers and Sprays

We can supply all your requirements in fertilisers, sprays, spraying and dusting machines, pest destroyers, etc. We carry the largest stocks in the State at competitive quotations. Prompt efficient service to all orders, large or small. Full information on the fertilisation and spraying of crops gladly given on request.

A.C.F.
REGISTERED TRADE MARK.

FERTILISERS

THERE'S A DIFFERENT
A. C. F.
COMPLETE MIXTURE
FOR EACH CLASS OF CROP,
also—

BONE DUST,
LIME,
SUPERPHOSPHATE,
POTASH,
SULPHATE OF AMMONIA,
NITRATE OF SODA,
NAURU PHOSPHATES,
SULPHUR AND SPRAYS
OF EVERY DESCRIPTION.

Write Now for Prompt Quote.

AUSTRALIAN CO-OP. FERTILISERS LTD.,
LITTLE ROMA STREET, BRISBANE.

BUTTER AND CHEESE CONTESTS.

BUTTER FOR EXPORT.

Once again Oakey achieved a striking performance in the butter section. Of four classes of butter for export judged the Oakey Association was successful in three, thus adding more honours to their long list of previous successes in Brisbane and other capitals. Oakey was first in export butter, thirty days' storage, salted, with 95½ points; first in export butter, eight weeks' storage, salted, with similar points; and in export butter, eight weeks' storage, unsalted, they were again successful with 96 points. In export butter, eight weeks' storage, the Maryborough Company's Kingaroy factory was first with 95½ points, beating the Oakey factory by half a point only. Details:—

Thirty Days' Storage, Salted.

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish	Total.
Possible points	65	27.	7	4	4	100
Oakey Creek District Co-operative Dairy Association, Ltd.	60½	20	7	4	4	95½
Southern Queensland Dairy Co., Ltd. ..	60	20	7	4	4	95
Caboolture Co-operative Dairy Association, Ltd., Eumundi	59½	20	7	4	4	94½
Warwick Co-operative Dairy Association, Ltd., Allora	59	20	7	4	4	94
Wide Bay Co-operative Dairy Association, Ltd., Gympie	58½	20	7	4	4	93½
Caboolture Co-operative Dairy Association, Ltd., Pomona	59	19½	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Goombungee	59	20	6½	4	4	93½
Maleny Co-operative Dairy Association, Ltd., ...	58½	20	7	4	4	93½
Dayboro' Co-operative Dairy Association, Ltd.	59	19½	6½	4	4	93
Downs Co-operative Dairy Association, Ltd., Miles	58	20	7	4	4	93
Downs Co-operative Dairy Association, Ltd., Toowoomba	58	20	7	4	4	93
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	58	20	7	4	4	93
Warwick Co-operative Dairy Association, Ltd., Mill Hill	58½	19½	7	4	4	93
Caboolture Co-operative Dairy Association, Ltd., Caboolture	58	19½	7	4	4	92½
Gayndah Co-operative Dairy Association, Ltd.	58	19½	7	4	4	92½
Queensland Farmers' Co-operative Dairy Association, Ltd., Grantham	58	19½	7	4	4	92½
Queensland Farmers' Co-operative Association, Ltd., Laidley	58	20	7	3½	4	92½
Maryborough Co-operative Dairy Association, Ltd., Mundubbera	57	20	7	4	4	92
Maryborough Co-operative Dairy Association, Ltd., Maryborough	57	19½	7	4	4	91½
Wide Bay Co-operative Dairy Association, Ltd., Wide Bay	57	19½	7	4	4	91½
Downs Co-operative Dairy Co., Ltd., Clifton	57	19½	7	4	4	91½
Kin Kin Co-operative Dairy Association, Ltd.	57	19½	7	4	4	91½
Queensland Farmers' Co-operative Association, Ltd., Booval	56½	19½	7	4	4	91

BUTTER FOR EXPORT—*continued.*

Thirty Days' Storage, Salted—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish	Total.
Possible points	65	20	7	4	4	100
Logan and Albert Co-operative Dairy Association, Ltd.	57	19½	6½	3½	4	90½
Downs Co-operative Dairy Association, Ltd., Crow's Nest	55	20	6½	4	4	89½
Queensland Farmers' Association, Ltd., Boonah	55	19½	7	4	4	89½
Chinchilla Co-operative Dairy Association, Ltd.	55	19½	7	4	*3½	89
Maryborough Co-operative Dairy Association, Ltd., Biggenden	55	19	6½	4	4	88½

Eight weeks' storage, unsalted.

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish	Total.
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	60½	20	7	4	4	95½
Oakey District Co-operative Butter Association, Ltd.	60	20	7	4	4	95
Wide Bay Co-operative Dairy Association, Ltd., Gympie	59½	20	7	4	4	94½
Downs Co-operative Dairy Association, Ltd., Miles	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Toowoomba	58	20	7	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Boonah	58	20	7	4	4	93
Warwick Co-operative Dairy Association, Ltd., Mill Hill	58	20	7	4	4	93
Port Curtis Co-operative Dairy Association, Ltd.	58	19½	7	4	4	92½
Caboolture Co-operative Dairy Association, Ltd., Pomona	57	20	7	4	4	92
Downs Co-operative Dairy Association, Ltd., Clifton	57	20	7	4	4	92
Downs Co-operative Dairy Association, Ltd., Goombungee	57	20	7	4	4	92
Gayndah Co-operative Dairy Association, Ltd.	57	20	7	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Booval	57	20	7	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Grantham	57	20	7	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Laidley	57	20	7	3½	4	91½
Warwick Co-operative Dairy Association, Ltd., Allora	57	19½	7	4	4	91½
Caboolture Co-operative Dairy Association, Ltd., Caboolture	57	19½	7	4	4	91½
Caboolture Co-operative Dairy Association, Ltd., Eumundi	56½	20	7	4	4	91½
Maryborough Co-operative Dairy Association, Ltd., Biggenden	57	20	6½	4	4	91½
Maryborough Co-operative Dairy Association, Ltd., Maryborough	57	19½	7	4	4	91½
Maleny Co-operative Dairy Association, Ltd., ...	56	19½	7	4	4	90½
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	56½	19½	6½	4	4	90½

BUTTER FOR EXPORT—*continued.*

Eight Weeks' Storage, Unsalted—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Chinchilla Co-operative Dairy Association, Ltd.	56	19½	6½	4	4	90
Dayboro' Co-operative Dairy Association, Ltd.	56	19½	6½	4	4	90
Southern Queensland Dairy Co., Ltd. ..	55	19½	6½	4	4	89
Kin Kin Co-operative Dairy Association, Ltd.	55	19	6½	4	3½	88
Logan and Albert Co-operative Dairy Association, Ltd.	54	19½	6½	4	4	88
Downs Co-operative Dairy Association, Ltd., Dalby	52	20	7	4	4	87
Downs Co-operative Dairy Association, Ltd., Crow's Nest	52	19½	6½	4	4	86
Maryborough Co-operative Dairy Association, Ltd., Mundubbera	52	19½	6½	4	4	86

Eight weeks' storage, salted manufactured in Queensland (from pasteurised cream), suitable for table use in Britain.

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Oakey District Co-operative Butter Association, Ltd.	61	20	7	4	4	96
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	60	20	7	4	4	95
Wide Bay Co-operative Dairy Association, Ltd., Gympie	59½	20	7	4	4	94½
Downs Co-operative Dairy Association, Ltd., Miles	59	20	7	4	4	94
Caboolture Co-operative Dairy Association, Ltd., Eumundi	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Toowoomba	58½	20	6½	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Grantham	58	20	7	4	4	93
Kin Kin Co-operative Dairy Association, Ltd.	58	19½	7	4	4	92½
Downs Co-operative Dairy Association, Ltd., Goombungee	57	20	7	4	4	92
Maryborough Co-operative Dairy Association, Ltd., Maryborough	57	20	7	4	4	92
Port Curtis Co-operative Dairy Association, Ltd.	57	20	7	4	4	92
Warwick Co-operative Dairy Association, Ltd., Mill Hill	57	20	7	4	4	92
Downs Co-operative Dairy Association, Ltd., Dalby	56½	20	7	4	4	91½
Maryborough Co-operative Dairy Association, Mundubbera	57	19½	7	4	4	91½
Warwick Co-operative Dairy Association, Ltd., Allora	57½	19½	6½	4	4	91½
Queensland Farmers' Co-operative Association, Ltd., Booval	56½	19½	7	4	4	91
Chinchilla Co-operative Dairy Association, Ltd.	57	19½	6½	4	4	91
Downs Co-operative Dairy Association, Ltd., Clifton	56½	19½	7	4	4	91
Maleny Co-operative Dairy Association, Ltd.	57	19½	6½	4	4	91

BUTTER FOR EXPORT—*continued.*

Eight weeks' storage, salted, manufactured in Queensland (from pasteurised cream), suitable for table use in Britain—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Maryborough Co-operative Dairy Association, Ltd., Biggenden	56½	19½	6½	4	4	90½
Caboolture Co-operative Dairy Association, Ltd., Pomona	56	19½	6½	4	4	90
Downs Co-operative Dairy Association, Ltd., Crow's Nest	54	20	7	4	4	89
Logan and Albert Co-operative Dairy Association, Ltd.	55	19½	6½	4	4	89
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	55	19½	6½	4	4	89
Gayndah Co-operative Dairy Association, Ltd.	54	19½	7	4	4	88½
Caboolture Co-operative Dairy Association, Ltd., Caboolture	55	19	6	4	4	88
Queensland Farmers' Co-operative Association, Ltd., Boonah	53	20	7	4	4	88
Queensland Farmers' Co-operative Association, Ltd., Laidley	54	19½	7	3½	4	88
Southern Queensland Dairy Co., Ltd. ..	54	19½	6½	3½	4	87½
Dayboro' Co-operative Dairy Association, Ltd.	55	19	4	4	4	86
Eight weeks' storage, salted, no preservatives other than salt.						
Oakey District Co-operative Butter Association, Ltd.	60½	20	7	4	4	95½
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	60	20	7	4	4	95
Wide Bay Co-operative Dairy Association, Ltd., Gympie	59½	20	7	4	4	94½
Caboolture Co-operative Dairy Association, Ltd., Eumundi	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Goombungee	58½	20	6½	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Boonah	58	20	7	4	4	93
Port Curtis Co-operative Dairy Association, Ltd.	58	20	7	4	4	93
Warwick Co-operative Dairy Association, Ltd., Mill Hill	58	20	6½	4	4	92½
Queensland Farmers' Co-operative Association, Ltd., Laidley	57½	19½	7	4	4	92
Downs Co-operative Ltd., Dalby	57	19½	7	4	4	91½
Kin Kin Co-operative Dairy Association, Ltd.	57	19½	7	4	4	91½
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	57	19½	7	4	4	91½
Maryborough Co-operative Dairy Association, Ltd., Biggenden	57	19½	6½	4	4	91
Queensland Farmers' Co-operative Association, Ltd., Booval	57	19½	6½	4	4	91
Warwick Co-operative Dairy Association, Ltd., Allora	56	19½	6½	4	4	90
Caboolture Co-operative Dairy Association, Ltd., Caboolture	56½	19	6½	4	4	90
Gayndah Co-operative Dairy Association, Ltd.	55	19½	7	4	4	89½

BUTTER FOR EXPORT—*continued.*

Eight weeks' storage, salted, no preservatives other than salt—*continued.*

——	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Maryborough Co-operative Dairy Association, Ltd., Mundubbera	55	19½	7	4	4	89½
Caboolture Co-operative Dairy Association, Ltd., Pomona	56	19	6½	4	3½	89
Maleny Co-operative Dairy Association, Ltd.	55	19½	6½	4	4	91
Maryborough Co-operative Butter Association, Ltd., Maryborough	55	19½	6½	4	4	89
Queensland Farmers' Co-operative Association, Ltd., Grantham	55	19½	6½	4	4	89
Chinchilla Co-operative Dairy Association, Ltd.	54	19½	6½	4	4	88
Downs Co-operative Dairy Association, Ltd., Clifton	55	19½	6½	4	4	89
Southern Queensland Dairy Co., Ltd. ..	54	19½	6½	4	4	88
Downs Co-operative Dairy Association, Ltd., Crow's Nest	53	19½	6½	4	4	87

CHEESE FOR EXPORT.

A remarkable sequence of successes was scored by the Pittsworth Dairy Company, Limited, in the cheese section of the dairy produce contests. Its "P" factory won the competiton for export cheese, white, with the very high points of 96½ out of a possible 100. The company also filled second and third places in this class. In the export cheese, coloured class, the company's "P" factory was again successful with 95¾ points, and in the medium cheese class, over two months old, exceeding 40 lb., the same factory was placed first with 95½ points. The company registered its fourth successive win in the class, medium cheese, under six weeks old, not exceeding 40 lb., with 94½ points. Details:—

Export, white, suitable for English market; two, each 70 lb. to 80 lb.; six weeks' storage.

——	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Pittsworth Dairy Co., Ltd., "P" Factory.. ..	46½	25	15	10	96½
Pittsworth Dairy Co., Ltd., "Y" Factory ..	46	25	14¾	9¾	95½
Pittsworth Dairy Co., Ltd., "T" Factory ..	45½	25	15	9¾	95¼
Downs Co-operative Dairy, Ltd., Lilyvale ..	45	24¼	15	10	94¼
Downs Co-operative Dairy, Ltd., Boodua ..	44	25	15	10	94
Downs Co-operative Dairy, Ltd., Westbrook ..	45	25	14½	9½	94
Yargullen Co-operative Dairy, Ltd.	44	24½	15	9¾	93¼
Downs Co-operative Dairy, Ltd., Koondai ..	43	25	14¾	9¾	92½
Southbrook Co-operative Dairy Co., Ltd. ..	43	25	15	9½	92½
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	43	25	15	9¼	92¼
Pittsworth Dairy Co., Ltd., "E" Factory ..	42	25	15	9½	91½
Biddeston Co-operative Dairy, Ltd.	42	24½	15	9½	91
Oakey District Co-operative Butter Association, Ltd., Kelvinhaugh	39	25	15	9½	88½

CHEESE FOR EXPORT—*continued.*

Export, coloured, suitable for English market; two, each 70 lb. to 80 lb.; six weeks' storage.

——	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Pittsworth Dairy Co., Ltd., " P " Factory ..	46	25	14¾	10	95¾
Irongate Co-operative Dairy Association, Ltd. ..	45½	24¾	14¾	9	94
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	44½	25	14¾	9¼	93½
Downs Co-operative Dairy Co., Ltd., Westbrook..	43	25	15	9¾	92¾
Yargullen Co-operative Dairy Association, Ltd. ..	44	24½	14¾	9½	92¾
Downs Co-operative Dairy Association, Ltd., Koondai	43	24¾	15	9¾	92½
Downs Co-operative Dairy Association, Ltd., Lilyvale	43	24½	15	9¾	92¼
Pittsworth Dairy Factory, Ltd., " T " Factory ..	43	25	15	9½	92½
Southbrook Co-operative Dairy Co., Ltd... ..	43	25	15	9½	92½
Pittsworth Dairy Factory, Ltd., " E " Factory ..	43	24½	15	9½	92
Warwick Co-operative Dairy Association, Ltd., Bony Mountain	43	24½	14½	9½	91½
Warwick Co-operative Dairy Association, Ltd., Greymare	43	24½	14½	9½	91½
Oakey District Butter Association, Ltd., Kelvinhaugh	42	24½	15	9½	91
Pittsworth Dairy Co., Ltd., " Y " Factory ..	42	24½	14½	10	91
Biddeston Co-operative Dairy Association, Ltd. ..	41½	25	14¾	9¾	91
Malling Co-operative Dairy Association, Ltd. ..	42	24½	15	9½	91
Oakey District Co-operative Butter Association, Ltd., Crosshill	42	24¾	14¾	9¼	90¾

Medium cheese, over 2 months' old; two, each not exceeding 40lb.

Pittsworth Dairy Co., Ltd., " P " Factory ..	45½	25	15	10	95½
Irongate Co-operative Dairy Association, Ltd. ..	44	25	14¾	9½	93¼
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	44	24½	14¾	9½	92¾
Oakey District Co-operative Butter Association, Ltd., Crosshill ..	42½	25	15	9	91½
Southbrook Co-operative Dairy Co., Ltd. ..	42	24¾	15	9¾	91½
Malling Co-operative Dairy Association, Ltd. ..	42½	24½	14¾	9½	91¼
Downs Co-operative Dairy Association, Ltd., Westbrook	42	24½	14½	9¾	90¾
Downs Co-operative Dairy Association, Ltd., Koondai	42	24½	14¾	9½	90¾
Pittsworth Dairy Co., Ltd., " Y " Factory ..	42½	24¾	14	9½	90¾
Downs Co-operative Dairy Association, Ltd., Lilyvale	41	24¾	14½	10	90¼
Oakey District Co-operative Butter Association. Ltd., Kelvinhaugh	41	24¾	15	9½	90¼
Downs Co-operative Dairy Association, Ltd., Boodua	41	24½	14½	9¾	89¾
Sunnyvale Co-operative Cheese Association ..	40	24½	14½	9¾	88¾
Pittsworth Dairy Co., Ltd., " E " Factory	39	24½	15	10	88½
Coalstoun Lakes Co-operative Dairy Association, Ltd.	40	24½	14	9½	88
Yargullen Co-operative Dairy Association, Ltd. ..	39	25	15	9	88
Warwick Co-operative Dairy Association, Ltd., Greymare	40	24	14	7	85

CHEESE FOR EXPORT—*continued.*

Medium Cheese, under 6 weeks' old ; two, each not exceeding 40 lb.

—	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Pittsworth Dairy Co., Ltd., " P " Factory ..	45	24¾	14¾	10	94½
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	44½	24¾	15	9½	93¾
Biddeston Co-operative Dairy Association, Ltd. ..	44	25	14¾	9¾	93½
Downs Co-operative Dairy Association, Ltd., Westbrook	43	25	15	9¾	92¾
Downs Co-operative Dairy Association, Ltd., Koondai	43	25	15	9½	92½
Oakey District Co-operative Butter Association, Ltd., Crosshill	43	24¾	14¾	9¼	91¾
Pittsworth Dairy Co., Ltd., " Y " Factory ..	43	24½	14¾	9½	91¾
Downs Co-operative Dairy Association, Ltd., Lilyvale	42	25	15	9½	91½
Yargullen Co-operative Dairy Association, Ltd. ..	43½	24½	14½	9	91½
Southbrook Dairy Co., Ltd.	42	24½	15	9¾	91¼
Oakey District Co-operative Butter Association, Ltd., Kelvinhaugh	42	24½	14½	9¾	90¾
Greenmount Dairy Co., Ltd.	42	24½	14½	9½	90½
Malling Co-operative Dairy Association, Ltd. ..	41	25	15	9½	90½
Pittsworth Dairy Co., Ltd., " E " Factory ..	41	25	15	9½	90½
Downs Co-operative Dairy Association, Ltd., Boodua	41	24½	14	9½	89
Pittsworth Dairy Co. Ltd. " D " Factory ..	40	24½	14½	8	87
Irongate Co-operative Dairy Association, Ltd. ..	39	24	14½	9	86½
Sunnyvale Co-operative Cheese Association ..	37	24	14	9½	84½
Coalstoun Lakes Co-operative Dairy Association, Ltd.	37	24	14	9	84
Warwick Co-operative Dairy Association, Ltd., Greymare	38	24	14	8	84

CARE OF THE FARM TEAM.

In a paper on this subject, at a recent farmers' meeting in South Australia, a local farmer, Mr. A. Cornish, said when buying or breeding horses an endeavour should be made to get an even team both in size and pace. It was advisable to breed two or three foals every year to keep up the strength of the team. Horses should always be watered before feeding, otherwise the food would not be digested. One should keep a regular time for feeding and watering the horses, and if possible they should be watered three times a day, especially during harvest. The water trough should be as close to the stables as possible, but not in the yard, because the horses would pick up a mouthful of hay and drop it across the yard as they went for a drink, and also drop chaff in the water. The horses should be stable-fed during seeding. He would feed with chaff for breakfast and dinner, and for tea as much hay as they would clean up with the last feed of chaff. The horses would do better if given bran or oats with their chaff. They should be tied up for feeding; that allowed each animal to have a fair share of the food. The horses should be groomed every morning, before harnessing. If one could not spare the time for that, at least the shoulders should be brushed to remove sweat. Grooming was also a preventive of sore shoulders. The harness should be made to fit properly; the collar should be fairly tight. Ninety per cent. of sore shoulders was caused through loose and ill-fitting collars. If backbands were used they held the collar up, and so helped to prevent sore shoulders; they also had a tendency to keep the team from tossing their heads. When using ten or more horses, the team should be worked in tandem to do away with a number of swings, and keep the horses in front of the implement. Horses should never be worked after sunset, especially during the winter months, because there was no evaporation, and their shoulders were more inclined to scald. The stables should be cleaned out regularly.

THE TREND TOWARD ECONOMY IS INCREASING THE DEMAND
FOR CUTS OF BEEF FROM LIGHTER CATTLE.
GENERALLY SPEAKING THE HEAVY AGED BULLOCK IS NO LONGER POPULAR

PLATE 85.—FOOD FOR THE MILLION—PART OF THE GREAT SHOW IN THE MEAT HALL.

THE MEAT INDUSTRY.

THE POSITION REVIEWED.

ECONOMICS OF MEAT PRODUCTION—THE NEED OF EFFECTIVE ORGANISATION—A NATIONAL ADVISORY BOARD SUGGESTED—NO NEED FOR PESSIMISM—QUEENSLAND THE CATTLE STATE OF THE COMMONWEALTH—"QUEENSLAND'S BEST EQUAL TO THE BEST OF ANY OTHER COUNTRY."

The general economics of the live stock and meat industry were reviewed by the Acting Premier, Mr. W. Forgan Smith, and a number of leaders in the cattle world on the occasion of the official opening of the Meat Hall at the Brisbane Exhibition on 8th August.

Mr. E. F. Sunners, Honorary Council Steward of the Royal National Association, read a very informative paper on the "Economics of Meat Production," in the course of which he suggested the creation of a national advisory board to control the meat industry of the Commonwealth.

The necessity for organising the meat industry was stressed strongly by Mr. Forgan Smith and others, and the general consensus of the gathering was that, by effective organisation, Australia would be in a position to take her proper place as one of the biggest producing countries of the world, and remain for all time the main supplier to the markets of Great Britain.

A report of the proceedings, including the text of Mr. Sunners's valuable paper, is presented in the following pages, and will no doubt be read with interest by all concerned in the stability and advancement of our pastoral industry.—Ed.

The Live Stock and Meat Industry Hall was officially opened by the Acting Premier (Mr. W. Forgan Smith) at the Show Ground on 8th August.

Mr. Ernest Baynes (president of the Royal National Agricultural and Industrial Association) explained that the idea of a meat industry exhibit originated from the Metropolitan Meat Industry Board of New South Wales, which had a somewhat similar, but not nearly so comprehensive, display at the last Royal Show in Sydney. He thanked the Queensland Government for its financial assistance, the Metropolitan Meat Industry Board of New South Wales for allowing Mr. W. H. Paine to come over and help them with the exhibits, Mr. Robert Joyce for the loan of the Lightfoot (Linde) refrigerating plant, Mr. Richard Gailey, the architect, and Mr. E. F. Sunners, the "guiding force" of the exhibit.

The Importance of the Pastoral Industry.

The Acting Premier (Mr. W. Forgan Smith), in officially opening the hall, said the Royal National Association was to be congratulated heartily on its enterprise and public-spiritedness. One realised, on going around the pavilion, how important the meat industry was to Queensland, and how interdependent the various industries were on the primary industry. "The cattle industry is not in a good position at the present time, nor has it been since the great slump in prices that followed the Great War," said Mr. Smith. "The men who are engaged in this industry have been carrying on under very great difficulties, and it is necessary for an exhibit of this kind to bring home to the people exactly what the industry means to them. There is no need for pessimism, however. There is no need to get our tails down and cry out in despair. Queensland is a great cattle-producing State. We should take stock of the facts of the situation, realise the problems involved, and apply our minds to the solution of them. What other countries have done, we can do."

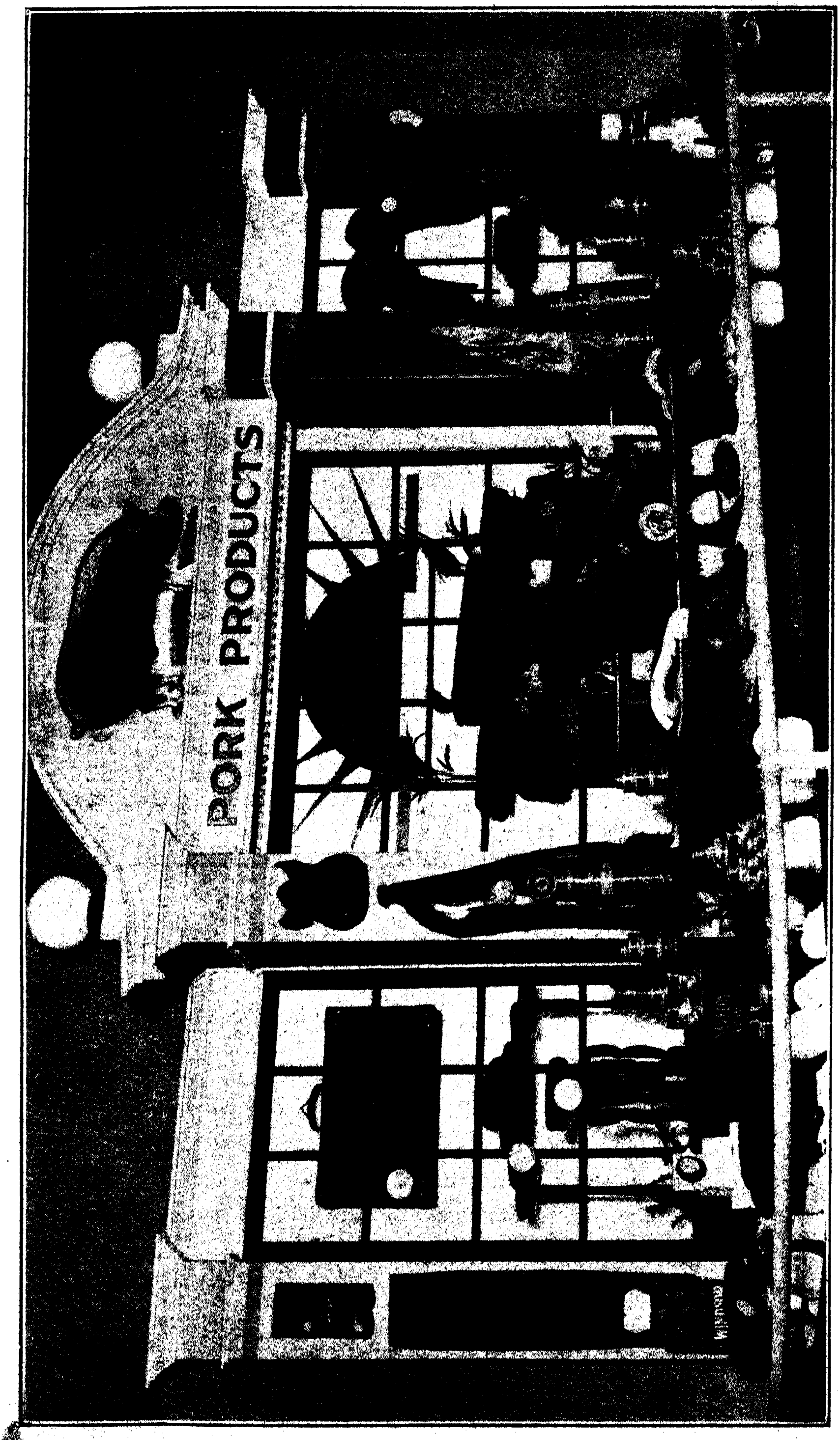


PLATE 86.—PIG PRODUCTS DISPLAY IN THE MEAT HALL.

"Queensland's Best Equal to the Best of any other Country."

Mr. Smith went on to say that the industry needed organisation in all its branches—production, treatment, and distribution of the product. It must meet organisation by organisation, efficiency by equal efficiency, at the very least. It was only along those lines that improvement could be effected. "Queensland's best is equal to the best of any State or of any other country. Nothing but the best is good enough for Queensland," be declared amidst sustained applause. He wished the association every success in the worthy enterprise it had launched. It gave him the greatest pleasure to declare the fine hall and the exhibition contained therein open.

Mr. W. J. Affleck (chairman of the council of the Royal National Agricultural and Industrial Association of Queensland) said: "We are in the business for the benefit of Queensland. Our hearts are in it." The meat industry exhibits would be an eye-opener, not only to sheep and cattle men, but to all citizens who visited the Show. This section, like all the others in the Show, had been organised for the benefit of the State. The new hall had cost nearly £3,000.

THE ECONOMICS OF MEAT PRODUCTION.

A NATIONAL ADVISORY BOARD SUGGESTED.

Mr. E. F. Sunners (Honorary Council Steward of the Royal National Agricultural and Industrial Association) read an informative paper on the economics of the industry, and suggested the setting up of a national advisory board. Following is the text of his useful contribution to current discussion on the position of the pastoral business:—

Attention is being called daily to the very critical condition of the live stock and meat industry of Australia, the beef cattle industry in particular, said Mr. Sunners. The production of beef cattle is carried on more extensively in Queensland than in any other State of the Commonwealth, the percentage of the cattle herd in the respective States as at the end of 1925 being about as follows:—Queensland, 49.52; New South Wales, 22.08; Victoria, 11.62; South Australia, 2.86; Western Australia, 5.81; Northern Territory, 6.56; Tasmania, 1.65. Of the cattle in the Northern Territory, probably 40 per cent. of the yield finds its way into Queensland, and, to some extent, South Australia. The balance of the Northern Territory yield seems to be disposed of by way of export as live cattle from Port Darwin or treated through the Wyndham works. This review particularly deals with conditions applying to 40 per cent. of the herd of the Northern Territory, as well as the herds of Queensland, New South Wales, Victoria, and South Australia; or, in other words, the herd of the eastern side of Australia, which equals about 87 per cent. of the total Commonwealth herd. It specifically covers the condition of the industry in Queensland, as this State has about 57 per cent. of the herd of the eastern side of Australia, and, to a large extent, is the key to the beef supply of this portion of the Commonwealth.

Outstanding Features.

The main outstanding features of the industry are as follows:—(1) The producer sees little or no encouragement toward the production of cattle, particularly of good quality. (2) There is undoubtedly room for some better form of industrial organisation in respect to the domestic trade, particularly as the domestic consumption of the Eastern States of Australia absorbs 80 per cent. of the production, and is regularly expanding. (3) The export trade is now conducted under conditions which are unfavourable towards the successful functioning of this division of the industrial organisation, and prohibitive in competition with other beef exporting countries. (4) The movement of live cattle from Queensland to other States is extensive, and, to some extent, this manner of distribution could be improved upon with advantage to the producers of Queensland and consumers of Southern States. It would seem that a proper solution of these main features is fundamental to the welfare and prosperity of the industry, and, therefore, the existing conditions under each of these headings calls for close scrutiny.

The Producer's Problem.

The average approximate export price paid in Queensland for bullocks for the years 1912 to 1927 (per 100 lb. delivered weight) was shown on a chart. The Southern Queensland price, on the average, now appears to be only slightly higher than in 1913, possibly 10 per cent. to 15 per cent., but the Northern price to-day is actually less than it was in 1913, approximately 10 per cent., Mr. Sunners continued. The cost of droving and railage has increased considerably, so that the producer's problem is the making of less than pre-war returns to cover post-war expenditure.

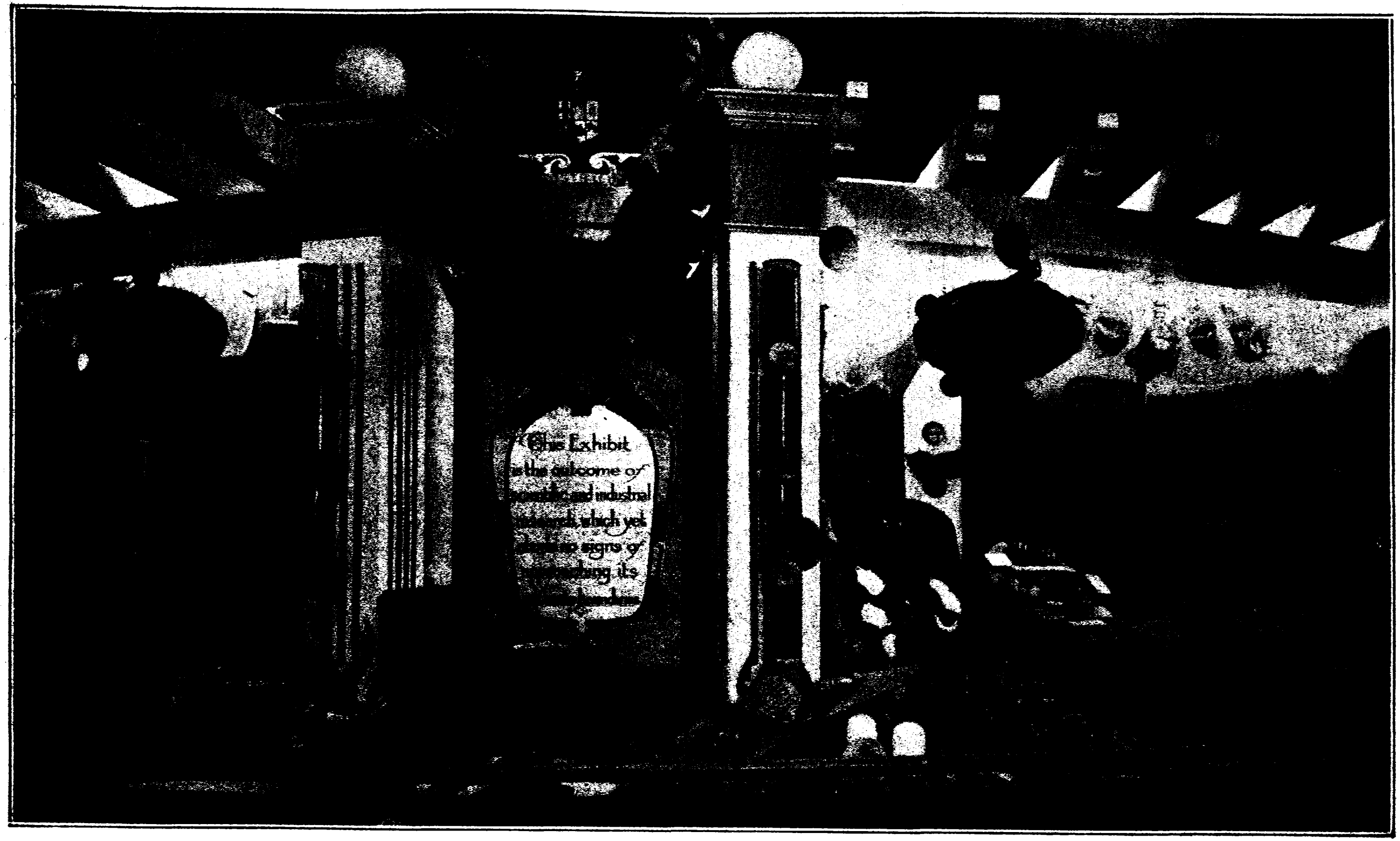


PLATE 87.—STRIKING PANELS IN THE MEAT HALL.
What Scientific and Industrial Research means to the Rural Producer.

Prices have been on the low level since 1921, and the general condition and quality of the herd is undoubtedly reflecting the low value of cattle. Had Queensland's production of beef been sufficient for domestic requirements only, the cost of beef to the consumer, no doubt, would have been on a higher price level than it has been during the past few years. The available supply, however, has been in excess of the domestic demand, and for the years 1920 to 1925 the average yearly surplus, over and above domestic and interstate requirements, has amounted to about 300,000 cattle, equal to 36 per cent. of the total production. This surplus influences the value of the total production, for the reason that, if the exportable parity is on a low level, then in effect, the total yield is first available for domestic consumption, until the over-supply bears the domestic price down to the price at which the exporters can afford to purchase. For the time being, at least, the oversea value seems to have reached and settled on a low price level, being influenced in this direction by the diminished purchasing power of the people of Great Britain and the Continent; also by the fact that the industry of the Argentine and Uruguay appears to be able to meet such a situation, as the supply of beef from these countries has been well maintained. In regard to the disposition of the total Queensland production, domestic requirements have absorbed about 34 per cent., interstate 30 per cent., leaving a surplus of the production for export amounting to 36 per cent.

Higher Production Costs.

It was to be expected that the cost of production, even under normal conditions, would show an upward tendency, but with industry properly organised, and functioning along sound lines, it no doubt would respond to this tendency, and maintain a balance between production and consumption. It is not to be expected, however, that in so short a period industry could respond to the accelerated cost of production of the past twelve years; firstly, due to the general effect of the war, and, secondly, to the particular effect of the protective policy of the Commonwealth. It is questionable, however, whether the industrial organisation connected with the meat industry has been able to offset even what might have been the normal increase in production cost, so that, with an export parity for the surplus which does not cover the increase, and with the domestic retail price level apparently fixed without regard to quality, or the real cost of production and marketing, it would appear quite understandable why the breeding and fattening of cattle cannot be otherwise than a discouraging business, and why the quality of the herd is deteriorating.

A Vital Industry.

The meat industry is a big vital industry. It should be regarded as one of the most important of the country, but there are economic principles connected with it that must be understood and recognised, not only by Governments, but also by the producer; and it is a further essential that the industrial organisation connected with it must be of such a character as to be able to function efficiently, and so organised as to be in a position to meet each successive demand in the changing conditions of national life. A close examination of the respective divisions of the industrial organisation should be made, to ascertain whether or not they are of this character. In respect to the slaughtering of live stock in Queensland for domestic requirements, it is found that this function is mainly performed by local butchers, whose business does not extend beyond supplying the demand for meat in their immediate vicinity. The domestic killing establishments are numerous, and the type of establishment does not permit of operations being conducted on a large scale, and, due to the absence of refrigeration and modern equipment, the full value of by-products cannot be obtained. As domestic requirements have expanded in this State, they have been met by a larger number of these small units, rather than by an expansion of the units themselves. Consequently there has been no progress in the direction of large scale utilisation of by-products, which is practicable only in large plants, being made possible by the use of refrigeration, and a volume of killing which justifies the installation of the necessary plant and equipment. Anything in the nature of the study of the arts and sciences connected with the meat industry appears to be entirely lacking, likewise any attention to more economic methods of merchandising. Although the domestic organisation of the State is responsible for the treatment of approximately one-third of the production, it would seem, in its present form, it cannot apply the necessary means to enable it to reduce the spread between producer and consumer. It would seem that some better type of organisation is long overdue wherever practicable—that is, in such cities and towns where the consumption is large enough to enable a modern type of plant to function. To some extent the Southern States have concentrated the domestic killing into larger units, but in these States, also, there is undoubtedly a necessity for an extension of the system before the domestic organisation can fulfil its requirements.

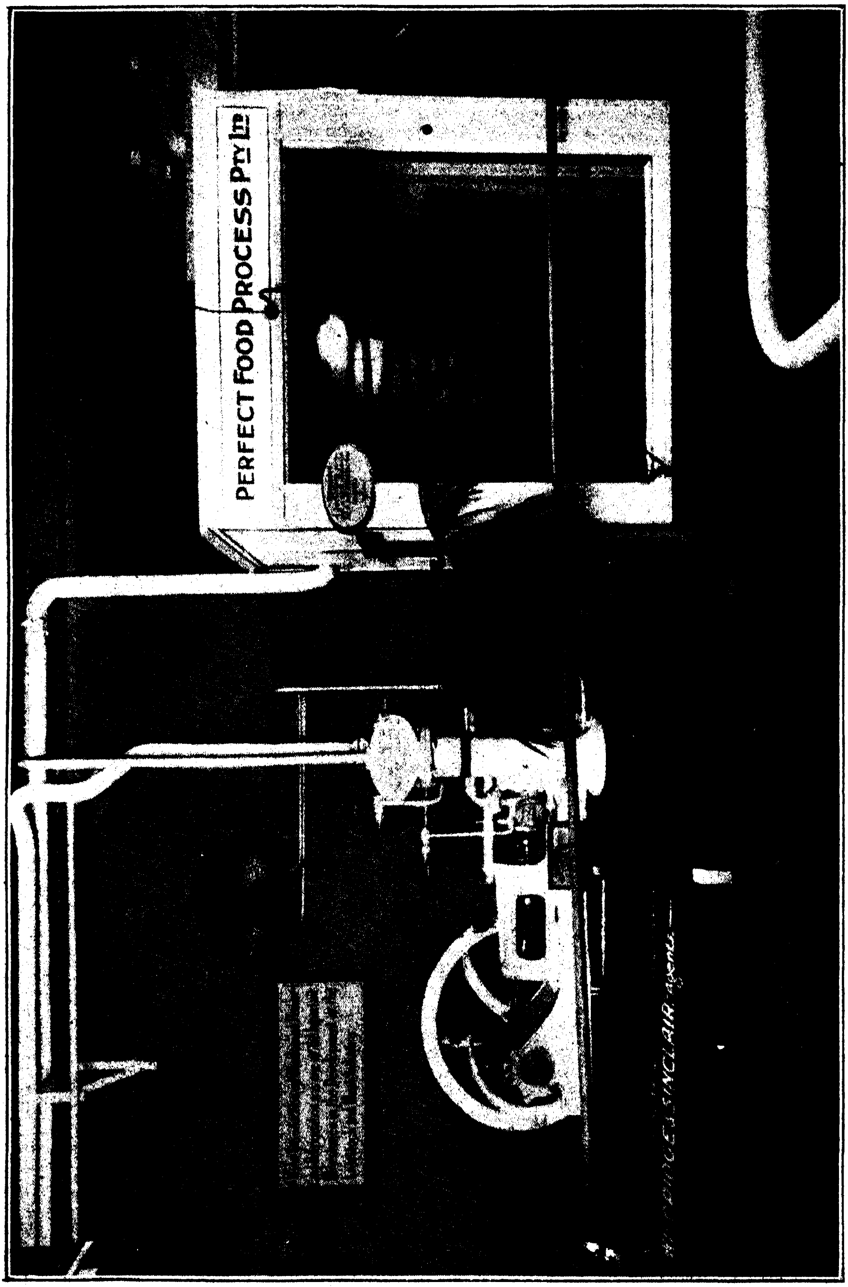


PLATE 88.—THE ENGINE-ROOM IN THE MEAT HALL.

The Industry's Competitive Capacity.

The export division consists of twelve plants, constructed at intervals from 1884 to 1914. The earlier type of construction differs materially from the modern plant design. The daily capacity of the respective works varies considerably. By reason of the Queensland export killing being concentrated into a short period of the year, a much larger capacity must be provided in proportion to annual volume than in the Argentine, where the killing extends throughout the year. In comparison to such a competitive country, where the working load is regular and economical, the Queensland plants, over an average of years, operated a little more than six months of the year, and during this short period used approximately but 56 per cent. of their combined capacity. Of course, the position of the individual plants varies, but the industry must be viewed from the aspect of its competitive capacity as a national unit. During the operating season the working load is very irregular, the full combined capacity being in use for possibly a month or two only. Mr. Sunners exhibited a chart showing the course of the maximum average and minimum load during the past twelve years. This method of working, he said, resulted in the operating period being saddled with the overhead expense of a very large idle period. He exhibited another chart illustrating the position as compared with an industry operating regularly, indicating that the overhead burden of the Queensland industry would be about three times greater per unit of product treated.

Export Organisation.

The average yearly tonnage of export meat products treated in the Argentine, Uruguay, and Australia for the years 1922 to 1926, inclusive, was shown on another chart, and he pointed out that the very large volume of business of the South American plants enabled them to secure lower operating costs in directions other than overhead. Another chart showed the monthly shipments of beef quarters from South America and Australia for 1926; but it was mentioned that it was unusual for Queensland to be shipping beef during the early months of the year. By the regular marketing of live stock the South American producers enable the exporters to operate their plants continuously, and furnish a steady flow of meat to the consuming markets, which has enabled the exporters to establish large selling organisations that can be depended upon to meet the daily needs of the people, Mr. Sunners said. There the respective branches of the industry are in harmony—production, manufacture, and distribution—so that, as an industrial organisation, it is both impressive and powerful. With them labour is permanently employed. In Queensland it is but casual, which does not promote satisfactory industrial relations. In comparison with the industry of South America, the exporters of this country have several outstanding disabilities, and it would appear that, without at least some partial solution of these root problems, the export industry must continue to languish. The stock returns as at the end of 1926 show a loss of 1,148,558 cattle, a little less than half the herd which yields the export surplus, indicating the exporters will suffer a heavy reduction in volume over the course of the next few years, further accentuating the disadvantage of this country. If the export business is to continue, the producer must recognise these problems, for, after all, the export industrial organisation cannot serve the market any better than the producer serves it with the basic raw material. Irregularity of supplies and indifferent quality will never secure the goodwill of the buying public in any market.

Interstate Trade.

Whether the movement of cattle to Southern States is economic depends, of course, on the locality from which the supply is drawn. No doubt, particularly in regard to store cattle, a certain number can be moved to advantage in this manner. Including fat cattle, the total border trade appears to amount to 30 per cent. of the Queensland yield, but in estimating the available cattle in the locality which might favour this trade, it appears that at least one-third of the supply could be killed in Brisbane to advantage, and shipped as chilled beef. Undoubtedly, too, this trade is expanding, and it may be no great length of time before the coastal areas will furnish large supplies in this direction. To rail live cattle from Brisbane to Sydney would be an economic waste, inasmuch as the cost of railage, and loss through shrinkage, would probably amount to from 30s. to 37s. more per head than the cost of shipping the chilled carcase. A close study of the distribution of live stock and population of the Eastern States of Australia, as at the end of 1925, shows that about 59 per cent. of the cattle, and 16 per cent. of the population, is in Queensland, while 41 per cent. of the cattle, and 84 per cent. of the population, is in the Southern States—New South Wales, Victoria, and South Australia. It further indicates that, if the herd remains about stationary at the 1925 level, the domestic requirements will absorb the equivalent of the present exportable surplus within fifteen years, and well within this period, if the subsequent decrease in the

Queensland herd is not in the meantime restored. It would appear that the time is not far distant when Queensland should be furnishing the Southern States with double the quantity of beef now supplied, and it would seem, therefore, that this is a feature of the industry which will call for systematic development, so that the producers of Queensland, and the consumers of Southern States, can both participate in the benefits of economic distribution. There is a further matter which should be mentioned at this juncture. It is thought in some directions that the production of cattle in Queensland should be permitted to languish until the domestic demand actually overtakes the supply, and that by doing so the producers' problem will be solved. It is perfectly evident, however, that the supply of cattle can never be adjusted to meet the daily requirements of the people, as there will always be months of heavy and corresponding months of light marketing; and, again, years which favour a large, and years which favour a small production. The herd should, therefore, be maintained on a level that ensures sufficient margin to provide for these variations, and, until the limit of resources has been reached, it is economically sound that some measure of surplus should be maintained, not only in the interests of the people in Queensland, but in the interests of the people in the Southern States, who, without supplies from Queensland to make up the shortage in their respective States, would have to be content with less beef or pay fancy prices for it. No primary industry that manages its affairs in this manner can expect to hold the goodwill of the people. Service only is recognised. Irregularity of supplies and price fluctuations will not promote meat consumption, which is a feature the producers must not lose sight of. This completes the examination of the three divisions operating between producer and consumer, and undoubtedly confirms that, under present conditions, the domestic and export industrial organisations cannot respond to higher production costs; also that the interstate business is not developing along economic lines, due to the domestic organisation not being equipped for, and the irregularity of the exporters' business not permitting, a thorough development of this trade.

Production.

The live stock producer has duties and responsibilities which are fundamental to his own prosperity. First, the supply of live stock should be large enough to permit profitable utilisation of the plant, and equipment of the industrial organisation, but on this point it is obvious that an adjustment of the capacity is necessary. Second, the supply, while necessarily varying with seasonal conditions, should be distributed throughout the year as evenly as possible, thus equalising labour and consumption needs. Third, the character of the live stock, in size, quality, and finish, should be such as to meet the needs and desires of the consuming public. The producer must specialise in the breeding of live stock, just as those engaged in any other enterprise must specialise in their particular functions, would they be successful. It is not sufficient that such questions as loss through ticks and bad branding, or damage from horns, bruising, &c., should be matters of opinion. There must be finality on these questions. Of course, producers naturally wish to make a profit, and unless they do make a profit year by year, on an average, production is discouraged.

Where the Industry Stands To-day.

This is where the cattle industry stands to-day, and, while it is a complex problem, it nevertheless must be straightened out, and undoubtedly it is time to begin, otherwise the undertaking will be more difficult later on. The first objective must be towards encouraging more and better production, and the surest way to do so is to concentrate upon reducing the spread between producer and consumer. This can be effected only through a form of industrial organisation suitable to the period, which can secure real economies in operating, and the fullest value for by-products. Any undue burden with which production is saddled should be reconsidered, so that the cattle business, in all its phases, might be stimulated within as short a time as possible. It is an essential industry, and one which cannot be confined to the boundaries of the respective States; and, although it is of a national character, there is perhaps no industry in Australia to-day so lacking in organisation, and the co-ordination of each party to it. It is an industry which can prosper only when each party to it not only performs his functions efficiently, but when all work together, and with full recognition of their respective duties and responsibilities. It may be taken for granted, therefore, that until each group connected with the industry is working in the one direction, and with a common understanding of each other's problems, no definite progress can be made. It is not to be expected that any type of organisation consisting of one group only could make any effective headway. Countries which have succeeded in lifting the live stock and meat industry [illegible] a high state of efficiency have done so through the co-ordination suggested, with the industrial organisation furnishing the constructive force for the benefit of all groups.

Attempts Towards Organisation.

During the past few years several schemes have been suggested for the improvement of the Australian live stock and meat industry, the beef cattle industry in particular, culminating in the formation of the Australian Meat Council, which, after functioning for a few years, was disbanded. The Commonwealth Government has certainly been sympathetic, and has endeavoured to find a solution to the problem. It is now proposed to establish an Australian Meat Board, with subsidiary boards in each State, the functions of which will be to promote the interests of meat producers in the production, sale, and marketing of their products; to confer with the exporters and with the Commonwealth and State Governments. The needs of the live stock and meat industry of Australia, however, appear to be much greater than the relief any such organisation can be expected to afford. Concentrating upon the exportable surplus of 20 per cent. of the yield, and overlooking the fact that 80 per cent. of the production is a domestic matter, has probably contributed more than anything else to the present unsatisfactory state of the cattle industry. The apparent indifference to quality for the domestic trade; the out-of-date methods of treatment of the greater portion of the stock treated; an almost entire absence of analytical chemistry and scientific research; and the lack of organisation and co-operation, could hardly be expected to result in any other condition. The maintenance of an exportable surplus is important, but, in proportion, it would seem to be a secondary matter when any scheme for the reorganisation of the industry is being considered. It would appear that the industry calls for a more complete investigation than has yet been suggested, but this should be the work of a highly trained personnel, rather than be delegated to any organisation representing one particular group or, for that matter, any combination of groups, whose functions could not specifically extend so far.

A National Advisory Board.

It might be suggested, however, that to bring all groups together on a common purpose, a National Live Stock and Meat Industry Board be formed, to include members from live stock associations representing the producers; members from master butchers' associations representing the retailers; members from exporters' associations representing the exporters; and members representing the selling agents; also that State boards be formed to function under the National Board. At first glance, however, it no doubt would be asked: "Whatever in the world have these different groups in common?" which is exactly the attitude of mind responsible, to a large measure, for the position of the industry to-day. They have everything in common. Apparently it is only lack of knowledge of each other's problems that keeps them apart, and the industry in a depressed condition as a whole. In order, therefore, to assist such boards, it might be further suggested that a Commonwealth Live Stock and Meat Industry Advisory Board should be established, with a personnel qualified to study all phases of the industry. The number of consulting members should be restricted to the qualifications required—i.e., live stock production (cattle), live stock production (sheep), producers; general economics of meat industry, plant operations and equipment, industrial management; scientific research, science; industrial relations, labour. The consulting members should be actively engaged and connected with the industry in a capacity which qualifies them to so act on the advisory board, preferably being presided over by a permanent chairman. The consulting members should be approved, and the chairman appointed by, the Commonwealth Government.

A Commonwealth Board.

The function of the Commonwealth Advisory Board should be: To study and advise the Commonwealth Government on all matters appertaining to the industry, from a national standpoint; to advise the State Governments on matters connected with the industry, as affecting the respective States in their relation to the national standpoint; to work with and advise the National and State Boards. The specific matters which the Advisory Board would investigate and study would be as follows:—Live stock production: Commonwealth costs of production, by defined areas; improvement in live stock; character of live stock in relation to demand; regularity of supply; water supply on stock routes. Live stock losses and damage: Ticks; dehorning; branding; bruising. Distribution of live stock: Geographical relationship between human and live stock population; distance from producing to consuming areas; railway organisation and live stock rates; economic methods of distribution. Live stock market operations: Methods of handling, selling, and cost. Grading of live stock: Uniform standards; facilities and service of grading. Inspection: Means of extending ante and post mortem inspection of domestic killing. Research: Develop practical data, and carry on researches into new and scientific problems connected with the industry under the following headings:—Production; marketing; improvement of old and invention of new industrial processes and products; transportation;

and the relative economy composition and nutritive value of the various cuts of meat. Centralised killing: Consider the extension of the system of centralised domestic killing, where and when practicable, and encourage the utilisation of by-products in all killing establishments. Secondary industries: Follow the development of all subsidiary secondary industries. Export: Such a board could study the disabilities of the exporters, and assist them towards a better state of affairs in their branch of the industry. It could possibly be of great assistance to the exporters on such matters as economies in operations, transportations, &c. On the broader questions of Empire development and trade, it would have the necessary knowledge to authoritatively represent the interests of the Commonwealth in respect to the meat industry.

Surplus Producing Areas.

The policy of the board should be to promote the fullest development of the available resources of the country suitable for the production of live stock, particularly investigating the position of Northern Queensland, the Northern Territory, and any other defined areas where cattle production is in a precarious condition. It should consider ways and means of encouraging production in any specific areas, where economic conditions might for the time being be less favourable than in the more thickly populated divisions, where products can be disposed of to better advantage, and where operating expense might be less. For example, after determining the average cost of production in the defined areas, the board might find in one or more the return to the producer is less than cost, and in consequence production is diminishing and the quality of the herd deteriorating. It might be found that, before the industry in such a division or divisions can be restored to a paying basis, an increase in the herd and an improvement in its quality is essential, inasmuch as, through the means of additional volume, the exporter's expense would be reduced, and the improvement in the quality would enhance the value of the products. The producer, however, may not have the resources, nor be in a position to secure the credit, to enable him to effect improvements, the benefits from which would not be immediate, consequently, as time goes on, the position goes from bad to worse. If it is in the interests of the Commonwealth that production in such areas should be maintained, and there should be no doubt on this point, then the advisory board, having thoroughly investigated the position, could bring the matter before the Commonwealth Government, possibly with a recommendation that a reasonable price per 100 lb. delivered weight of the respective export qualities should be guaranteed the producer for a period long enough to enable the improvements to be made. Such a guarantee, however, should be given to producers individually, upon their giving satisfactory evidence to the board that steps will be taken to bring about the necessary improvements in their herds. Anything in the nature of an unqualified subsidy would not be likely to bring about the required change in existing conditions, whereas a guarantee to make possible a desired objective would be more in the nature of a business investment, and would be nationally sound. It could be expected the liability of the Commonwealth would be diminishing throughout the period of the guarantee, and that the benefits derived would be permanent.

Future Considerations.

In course of time all the large cities of the Commonwealth, no doubt, will have large public killing establishments, such as in Sydney and Adelaide. With similar single units in Melbourne and Brisbane to those already existing in Sydney and Adelaide, the average tonnage per unit of these main plants would compare favourably with the average tonnage per unit of the Argentine plants, thus providing an industrial organisation of competitive dimensions that could be availed of for export killing. Other great policy matters may arise in the future, perhaps such questions as direct ownership of these institutions by the people, or the extension of their functions to the point of furnishing the entire service between producer and retailer. These, however, are questions for the future to determine. The immediate suggestion is to grapple with the very adverse condition of the industry as it stands to-day, and through the means of an organisation broad enough to broaden with the future. Australia is destined to expand, and the live stock and meat industry, as a whole, to fulfil its economic functions, must keep pace with such expansion, otherwise fail to pull its weight in the future development of the Commonwealth.

Conclusion.

The intention of this paper is to afford a brief general insight into the existing condition of the live stock and meat industry, and to suggest what might lead to a practical and effective basis of organising it, so that this great industry can be guided to a state of proficiency. Immense changes bearing on the question of competitive costs are taking place in the world of industry and business to-day. Science and engineering are for ever concentrating in this direction; enlarged volume has become an essential; intelligent and accurate data has become an absolute necessity; positive elimination of waste is being sought; in fact, every old method, process, and product is being challenged in one way or another, and any country that sits idly by, cannot hope to keep its place in the competitive markets of the world to-day. On the other hand, should the industry of this country seriously adopt a progressive attitude, sinking individual interest in favour of organised effort, it can no doubt look for a fair measure of governmental support in the solution of its initial problems, thus enabling it to approach a more secure and prosperous condition for itself, and for the welfare of the country in general.

THE MEAT INDUSTRY EXHIBIT.

Mr. J. B. Cramsie (chairman of the Metropolitan Meat Industry Board of New South Wales) congratulated Mr. Sunners on his paper. "This is the finest exhibition of its kind I have ever seen," he said. "I was asked if this is a better show than the one we had at Sydney. It is better, undoubtedly, but next year we will have a better show than yours. With the same spirit of harmony and co-operation that exists now, we will make the producers realise the necessity for organising their industry on a thoroughly profitable basis.

"Make Queensland the Best Mutton-producing State!"

"I have not seen, in my experience of more than thirty years, such high quality sheep as those in the refrigerating chamber. I did not think it was possible to produce such quality outside of New Zealand. They are Corriedales, and they are without compare. My only regret is that they are not produced in greater numbers in the Darling Downs, to make Queensland the best mutton-producing State in the Commonwealth."

The Beef Exhibits.

Mr. Cramsie said the beef exhibition was an excellent one. It was ridiculous to say that Queensland could not produce early-maturing beef. If breeders would take the cut-outs in the exhibition as their model types they would have nothing to fear from the Argentine. Two years ago he spent eighteen months touring the world in the interests of the Australian meat industry, and he came back convinced that the time was ripe for Australia to go ahead and take her place as one of the best meat-producing countries in the world. He hoped, as a result of the exhibition, that people would realise the necessity for proper organisation of the industry which was so necessary for the development of Australia. "This country was developed originally by cattle men," declared Mr. Cramsie, "and until we have the whole of our country under occupation it will be necessary for the cattle industry to prosper. Our forefathers, who pioneered the producing industry, had plenty of difficulties to overcome, but they overcame them, and we will have to do the same. It is only by organisation that Australia can take her proper place as one of the biggest meat-producing countries of the world, and the country that will remain for all time the supplier to the markets of Great Britain." (Cheers.)

Mr. W. H. Paine (head of the publicity branch of the Metropolitan Meat Industry Board of New South Wales) spoke of the necessity for breeding good cattle to get good by-products. "Good quality cattle means larger income from by-products," he said.

Mr. J. L. Wilson (Calliope) proposed a vote of thanks to the Acting Premier, which was carried with acclamation, and Mr. Smith briefly responded.

"Super Excellent."

In the course of a subsequent Press interview Mr. Cramsie, referring to the Meat Industry Exhibit, said:—

"This display is super-excellent. After an eighteen months' tour of the world in the interests of the Australian meat industry, I can conscientiously say I have never seen a finer display, and I saw all that was to be seen."

Mr. Cramsie added: "It shows that Queensland can produce a quality of beef equal to that from any other producing country in the world, and let us hope that one result of this display will be that the Queensland producer will be immensely heartened, and will do his share in organising this important industry in its various stages of production, treatment, transport, and marketing, so that the industry can be put on a sound footing, and become a really profitable one, not only for the primary producer but also for all others concerned."

Australian Secondary Industries.

Mr. Cramsie was particularly pleased with the display from the point of view of production, treatment, and by-products, right through the secondary industries, and their finalised products, which have been brought back from various countries where they are manufactured at present. "I hope, however," he said, "that these higher grade by-products will be manufactured in Australia in the near future, in furtherance of our new secondary industry policy."

Mr. Cramsie urged every one interested in the meat industry to study the slogans in the pavilion.

The Meat Industry Exhibit, which was one of the finest features of this year's Show, is described in detail in our Special Show Report in this issue.

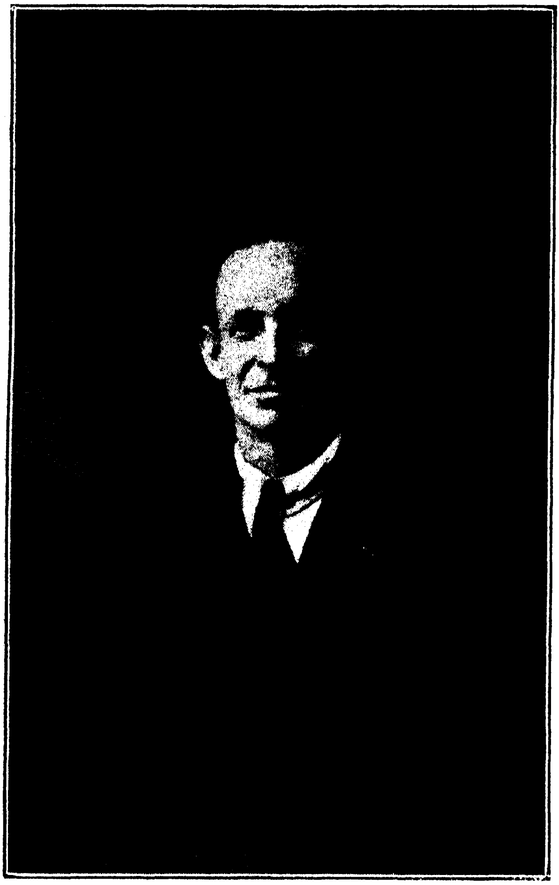


PLATE 89.—JAMES A. HEADING, D.C.M., M.M.

Mr. Heading, who has been re-elected Chairman of the Queensland Co-operative Bacon Association, Ltd., Murarrie, is on the Board of Directors of the Farmers' Co-operative Distributing Co., Ltd., and also the South Burnett Co-operative Dairying Co., Ltd. He is Chairman of the Murgon Shire Council and President of the Murgon Show Society.

He served during the Great War with the 47th Battalion, A.I.F., and was awarded the Distinguished Conduct Medal and the Military Medal for conspicuous valour in the field.

PIGS AT THE BRISBANE SHOW.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The increased interest evidenced throughout Queensland in the production of more and better pigs on every farm, was again emphasised in a striking manner at this year's Royal National Show at Brisbane, at which a splendid entry of good-quality pigs, comprising representatives of all the breeds common in Australia, was penned. The Pig Section at exhibitions of this nature always attracts considerable attention; it draws more than its proportion of the crowd of spectators and is of the greatest educational value. People see the pigs in their Sunday dress, as it were, and are attracted to them in a way hardly possible on the farm, where piggy does not always receive his fair share of attention or comfort. It is educational also in that people from far and near have an opportunity of inspecting representative males and females in the several breeds and of comparing their type and quality with those of other breeds, with which they are, possibly, not altogether conversant. It carries an educational value also in that it shows that, if given reasonable care and attention, and if provided with anything like satisfactory accommodation, pigs can be kept clean and healthy and in an attractive condition. People see the pigs in clean, comfortable, commodious pens, nicely bedded down with clean straw from which no unpleasant odours emanate, nor with which people of any class could find complaint. This is one of the most important features of the Show, for, unfortunately, there is a very erroneous impression abroad that pigs are other than clean, healthy animals. A visit to the pig pens at the Exhibition dispels this idea and creates quite a favourable impression of His Majesty the Hog.

This year, owing to Quarantine Regulations, the showing of pigs was confined solely to Queensland-owned animals from Queensland farms; no interstate porcine stock being admitted to competition. This being so, it was indeed satisfactory to note that the entry was well up to the standard of previous years and the quality quite as good. The number of exhibitors was also well up to that of former shows, the ranks of the absent Southern exhibitors being well filled by new and enthusiastic Queenslanders making their first attempt at exhibiting at a big show like the Royal National. Quite a satisfactory feature of this, too, was the fact that a number of these new exhibitors were folk who have become interested in better pigs per medium of successful Pig Clubs in operation in their respective districts. This is quite as it should be, and indicates the possibilities and advantages of club membership and enthusiasm. Several special classes were provided for Pig Club members and, though the entry was not large, it was complete. As an instance, George and Eileen Davison, Pig Club members from the North Arm School, penned several of their Large Black pigs. George Davison, junior, won a Large Black boar, presented by Captain Callcott, an enthusiastic Victorian breeder, at the North Arm School Pig Club contest last year. After the judging, George's father came to the writer and stated that he had decided, in consultation with his children, to have me select for them a suitable Large Black sow. This was done, and the result has been that the Davison family have since sold quite a number of selected stud boars and sows at from 6 guineas each upwards, and have booked orders for a number more.

Another typical instance was the Tamworth bacon pigs, exhibited by the Alford boys, members of the Pomona Pig Club. These people have become successful breeders of Tamworth pigs; they have three boys as members of the Pig Club and have made numerous sales. The Palmwoods State School Pig Club, represented by the Roy boys, sons of Mr. and Mrs. C. F. A. Roy, of Palmwoods, have also, through winning a Middle Yorkshire sow and through purchasing from another club member a Middle Yorkshire boar, also donated by Mr. Ralph Joyce, a prominent Victorian breeder, of Kyabram, Victoria, now become quite established as breeders of Middle Yorkshires and, at exhibition time, had practically 100 guineas' worth of stud stock on hand. At the stud sales, one of their boars was sold to a resident of New Guinea, another two to farmers at Gayndah and Coalstoun Lakes, another to the Colonial Sugar Refining Company's mill at Macnade, North Queensland, and several to breeders, including the Salvation Army Training Farm for Boys at Riverview, Queensland. They booked orders for other pigs from a litter expected shortly. The Cordwell Brothers, of Kureelpa, members of the Mapleton Pig Club, though not exhibitors at the Exhibition themselves, had some of their pigs entered in the name of their father, Mr. W. Cordwell, of "Allendale," Kureelpa. This gentleman, in discussing the value of this feature of pig raising, admitted freely that their success as breeders of Poland-China pigs was due entirely to Pig Club work: they had some excellent quality stock, won several prizes, sold several sows at 6 guineas each at four months' old, and are on the highway to a successful future. Mr. Cordwell freely assured me that his farm revenue has increased by more than £100 per annum since his boys have taken up this class of work and have introduced better quality stock, for which they have many buyers. One of George Davison's Large Black boars realised 14 guineas at public auction, and it is quite certain that had he offered his stud sow, "Wattle Violet," she would have topped the sales.

The Boonah Rural School had a pair of excellent quality Berkshire boars entered. They won first prize, and were really very attractive animals.

Another new and attractive feature at this year's Exhibition was the Litter Weight Contest, in which one litter of pigs, weighing 1,478 lb., was shown, and another litter just three months old topped the scales at 651 lb. These litters were well worth inspection, the winning litter of Gloucester Old Spots shown by the Kingston Pig Farm Co., were really choice. The second prize litter, owner by Mr. George Setch, of Marburg, of excellent type and quality and well worth seeing, were of the Berkshire-Tamworth cross. The Berkshires shown by the Gatton College sold readily at auction at stud values.

The Bacon Pig Carcase Contest, another new class, created quite a big interest and featured several new and important ideas in regard to the production of bacon pigs. Mr. Percy Campbell, of Lamington, won the first and third prizes in this class with Duroc-Jersey crosses, while the Kingston Pig Farm Co. annexed second with a pen of Gloucester Old Spot-Tamworth crosses. Quite a number of pigs in this competition were over-weight and too fat for best local trade. The class has been productive of a great deal of good.

PLATE 90.—G. F. DAVISON'S FIRST PRIZE LARGE BLACK SOW, "WATTLE VIOLET," BRISBANE SHOW, 1927.

The Large Black breed of pig, recently introduced into Queensland, comes with a good reputation for prolificacy, heavy milking capacity, and docility. The breed has a value especially for cross-breeding purposes for bacon pig production, and is a favourite with many farmers. Several of this sow's progeny were entered in the Pig Club Classes, one young boar realising fourteen guineas, at auction, at five months old. This sow's first litter of nine reared were valued by the Instructor in Pig Raising at more than ninety guineas.

The pen of Model Bacon Pigs, including Tamworth-Berkshire crosses and a Middle Yorkshire champion from the Nambour Pig Club, and owned by William Lowe, were also well worth inspection. There were three pens of good-quality porkers quite close to the Model Baconers and to the Pig Club classes.

The Berkshires.

The championships in the Berkshire section were won by Mr. H. Franke, of Cawdor, who won with both boar and sow, the reserve in the boar classes going to Goodna Hospital and in the sow classes to Mr. Mat. Porter, of Wondai. The Empire Challenge Cups were thus won by Mr. Franke, who also annexed the ribbons presented by the Australian Stud Pig Breeders' Society. At a later stage Mr. H. Franke won the silver cup presented by Mr. R. G. Watson for the most successful exhibitor in the pig section; Mr. C. W. Krause, of the Marburg district, being a very close runner-up. The Berkshire section invariably attracts a good entry, this breed still retaining pride of place as far as general popularity goes in this State. The entry of young stock particularly was well worthy of notice; admittedly there were no "record-breakers" at the Stud Sales. The general average was, however, well up to the standard of former shows and proved quite a valuable addition to the Stock Sales of the Show.

The Yorkshires.

We have no Large Yorkshires in Queensland yet, so that competition was restricted to the Middle Yorkshire breed. Competition in this section is always more or less limited at Brisbane, though undoubtedly the quality is there. On this occasion there were only two—but two very enthusiastic—exhibitors, both of whose pigs were shown in good breeding condition—not over-fat. The champion boar was the property of Mr. Max Gornik, of the Manly-Wynnum district. In the younger classes Mr. C. F. A. Roy and his Pig Club members from the Palmwoods district were successful, winning both first and second prizes in several classes. The Middle Yorkshire seems to be slowly regaining ts former popularity, especially for cross-breeding purposes with the Berkshire.

The Tamworths.

As is usual at the Brisbane Show, Tamworth pigs were well represented, this breed having forged ahead in popular favour in recent years with all classes of the farming community. The exhibits at the Show created quite a favourable impression, particularly the bacon pigs of the Tamworth-Berkshire cross exhibited in the Litter Weight Contest, in the Bacon Pig Carcase Contest, and in the Model Bacon Pig pens.

The Gatton College annexed the championship in the boar classes; they also won the reserve championships, that for sows going to the Dunwich Hospital, Stradbroke Island. There were many fine-quality Tamworth pigs exhibited; particularly fine were many of the young pigs under twelve months old. While such high-quality "Red Pigs" come forward there is not likely to be any slackening in the demand or loss of popularity in the breed.

Yet it cannot be said that the Tamworth breed shows to advantage in the somewhat confined area allotted to this breed at the Show. Tamworths show up to more advantage in a good sweet potato patch or grazing over succulent lucerne paddocks. It is not the nature of the Tamworth pig to be closely confined or continuously penned—he was not developed for that purpose. He gives of his best when allowed range and abundant supplies of bulky foods. It is for this reason that Tamworth sows and litters do not appear so comfortable or so attractive as the Berkshires or the Yorkshires, &c.

The Poland-Chinas.

While the foregoing is certainly true of the modern representatives of the original wild pig of Old England (the Tamworth) it does not apply in the same way to the American breeds, especially the Poland-China for, with their glossy, black coats, sparsely marked with white points, they show their good qualities to considerable advantage.

The exhibitors in this section, too, had spared no effort in vieing one with the other to show their stock to the best advantage possible. As it happened, there were about an equal number of new and old-established breeders competing, the former including Mr. C. W. Krause, of Marburg, winner of the championship in the boar classes and other prizes, and Mr. W. Cordwell, of Kureelpa, a successful exhibitor of young stock. Mr. Alan Cooke, of Maleny, was also included, though his entry was confined to one animal only. The Kingston Pig Farm Company could also be classed as a new exhibitor in this section, though they have exhibited in other pig classes at former shows. Of the old-established breeders, Mr. J. H. Whittaker, of Broxburn, on the Darling Downs, and the Queensland Agricultural

College and High School, Gatton (still well and favourably known as the Gatton College), were successful.

Altogether, the Poland-Chinas were very good, though the tendency in this breed is for the animals to be shown almost in an over-fat condition.

The Duroc-Jerseys.

Both championships in these classes were annexed by Mr. Percy V. Campbell, of "Lawn Hill," Lamington, via Beaudesert. The largest exhibitor and breeder of this type in this State, Mr. Campbell's pigs were shown in ideal condition; his experience with this breed has been such as to create a very favourable impression. A customer of his, Mr. W. Koehler, of Yamsion (a new exhibitor, too), was also a competitor, and scored a proportion of the prizes, his pigs being favourably commented on. The Duroc-Jersey is as yet a new breed in this State, though it has had a three years' run. Breeders of this type are handicapped in their progress by the difficulty of securing fresh and unrelated strains of blood. The breed has proved its capabilities as far as it has been possible for them to do, and the fact that they came out on top in the Bacon Pig Carcase Contest adds more laurels to their crown. Without doubt, the breed has come to stay, for breeders far and near are interested in these "Red Americans," and seem intent on continuing the experiments.

PLATE 91.—THE FIRST PRIZE LITTER IN THE LITTER-WEIGHT CONTEST AT BRISBANE SHOW, 1927. SHOWN BY THE KINGSTON PIG FARM CO., KINGSTON.

Pure-bred Gloucester Old Spots, carrying imported blood of the most up-to-date type. The nine pigs in this litter, exactly three months old on Judging Day, weighed 651 lb., an average of 72⅓ lb. These pigs were well developed, were even in size, and were growing rapidly. The Litter-Weight Contest is well worth studying; it is a new class at Agricultural Shows, and must be clearly understood to be appreciated. Details may be obtained on application to the Department of Agriculture and Stock.

The Gloucester Old Spots.

It is not the intention in this article to write up the breeds in their order of merit or in the order in which they are catered for in the Show schedules, nor are the remarks based on the number of entries or successes. Nevertheless, the G.O.S. (as it is most frequently referred to in literature) created a very favourable impression, this year's exhibits being the best that has yet been seen at any show in Australia, though the exhibits at the Melbourne Show always attract considerable attention and are of high quality.

The Kingston Pig Farm Company, of which Mr. R. G. Watson, the well-known auctioneer and the former secretary of the Queensland Branch of the Australian Stud Pig Breeders' Society, is principal, were the only exhibitors, and consequently annexed all the prizes in this section of the Show. Mr. Bert. Whittaker, a graduate of the Young Judges' Competitions and an enthusiastic junior in the pig world and his mate "Bill," were in charge of the Kingston entries and had them in excellent form. This breed continues to make rapid progress and to create a favourable impression among both pork and bacon pig fanciers. It is an Old World breed with a reputation dating back many years and, though among the most recent introductions here, has made headway indicative of future successes and is, therefore, already well established.

Crosses of this type were shown in the Litter Weight Contest, Bacon Pig Carcase Contest, and in the Pork classes.

Large Blacks.

Though entries in the Large Black classes were confined to the exhibits of Mr. G. F. Davison, of North Arm, and his son George, they were, nevertheless, of good quality and of up-to-date type, the quality of the imported sow "Wattle Violet," comparing more than favourably with illustrations of stock exhibited at the Royal Agricultural Shows of England and other countries.

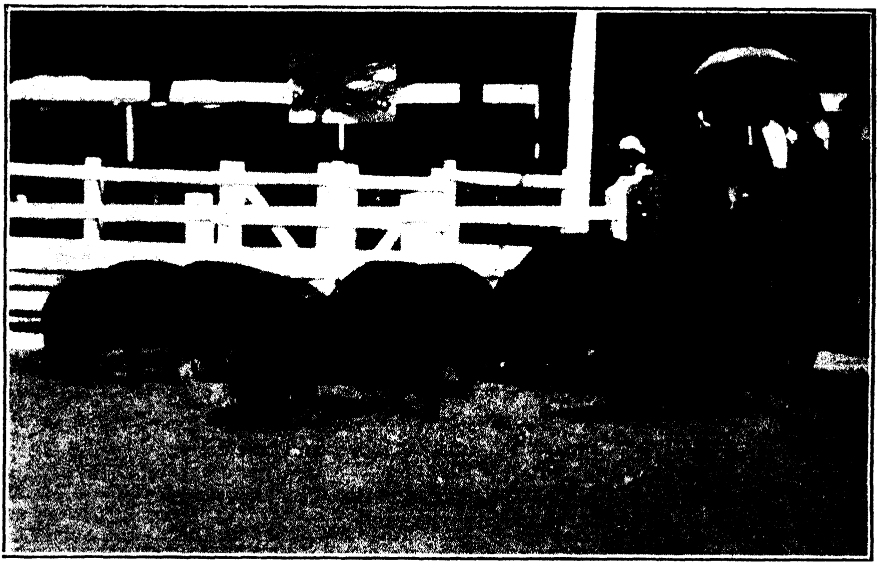


PLATE 92.—THE SECOND PRIZE LITTER IN THE LITTER-WEIGHT CONTEST CLASS AT BRISBANE SHOW. SHOWN BY MR. GEORGE LETCH, OF MARBURG.

The ten pigs in this Litter, at five months and three days old, turned the scales at 1,478 lb. It is probably the heaviest Litter yet exhibited at an Australian show. The sire, a pure bred Berkshire, the dam a crossbred Berkshire-Tamworth sow. There were fourteen pigs in the Litter, of which ten were reared. Average weight per pig, 147·8 lb., at five months three days old.

This is a breed with an excellent reputation, many farmers having a great fancy for the long, roomy, deep-bodied, heavy-milking sows for cross-breeding purposes.

In general outline and type there is not a world of difference between the Gloucester Old Spot and the Large Black; in fact, they are both original types from Old British stock, the former coming from Gloucestershire, the latter from Devon and Cornwall, and both now well distributed throughout the world. At any rate, if Large Blacks of equal quality and of similar type can be produced continuously in the North, the demand will follow and the breed will regain its early popularity.

Display of Pork and Bacon Products in the Live Stock and Meat Industry Hall.

Reference to this section of the Show activities would not be complete without reference to the display of Fresh Pork and of Pork Products in the new Live Stock and Meat Industry Hall (see Plate 86) in which, in addition to the general display of manufactured products as shown, the display of fresh pork and pork delicacies and bacon pig carcases was included, the latter in the specially constructed glass refrigerating chambers occupying the whole of one end of the hall.

The attractive and instructive fresh pork display, tastefully prepared and arranged under the guidance of Mr. Brunckhurst, manager of the State Butcheries, was a show in itself and drew the attention of thousands of spectators as they moved around this hall of wonder—a special feature of the Exhibition. The display of beef and mutton and of the various products resulting therefrom, together with the trade displays, were a sight long to be remembered, and it is satisfactory to note that just as favourable comment was passed on the Pork and Pork Products display as on any other section of those staged.

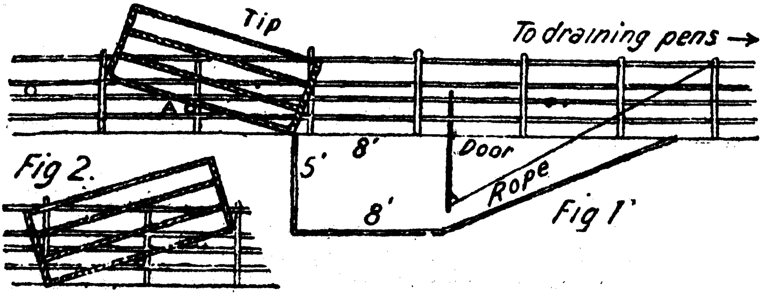
The Pork Products display featured not only the usual manufactured products—bacon, hams, and lard—but all manner of lines from the salted intestines used for sausage casings, the blood used as stock food and as a fertilizer, the various internal organs and the products manufactured therefrom, right down to the gall from the liver, which product is not wasted, it being used in the printing trade as a special necessity. Hoofs and glue pieces used specially in the manufacture of glue; lard oil manufactured from lard; hair used in upholstering work, &c.; the skin of the pig used as leather for permanent durable covers for specially prepared saddles, suit-cases, pocket wallets, purses, &c.; canned goods, including every variety of sausage, saveloys, Camp Pie, Rex Pye, pork brawn, pork and beans, and minor sandwich lines, ham pates, &c., Devon sausage, Strasburg sausage, ham delight, black and white puddings, brawn, bloodwurst, liverwurst, &c. Lard was shown packed in cans for export and in bladders and 1 lb. pats for local trade, while in addition to sides, flitches, shoulders and hams, rolled bacon, a special delicacy, was shown.

The display comprised a most attractive collection of Pork Products and drew admiring crowds throughout the Show.

In the Court of the Department of Agriculture and Stock a special display of Pork Products was also tastefully arranged and was much admired. Altogether, the Pig, Pork, and Bacon sections added considerable interest and value to the national display of Queensland's primary and industrial products.

DIPPING DEVICE.

At the request of a Tasmanian correspondent, a tip device for dipping sheep is reproduced:—When small sheep dips are used, it is necessary to do a certain amount of lifting, and when big wethers are being handled this is a heavy piece of work. Mr. J. S. Mortimer, of Katunga, to obviate this handling, employs a tip as shown in the illustration. The tip is balanced on a piece of iron piping, which rests on the rails of the fence, the piping being nearer the entrance end. When the sheep are entering the tip, the end nearer the dip is sustained by a rail underneath it and resting on two fence rails, as in Fig. 2. When the cross rail is withdrawn, the tip falls down, sliding the sheep into the dip. Mr. Mortimer's dip is 20 feet long by 2 feet wide at the top, 8 feet long by 1 foot wide at the bottom, and 5 feet deep, built of bricks in cement. He places great value on the swing door, by means of which sheep are kept in the liquid for about a minute, after which the door is lifted by the rope tied to the top rail of the fence.—"Australasian."



COTTON-GROWING IN 1860.

Mr. J. W. Willis-Jenyns, of Main street, Kangaroo Point, forwards the following interesting note, together with a photograph of two highly-esteemed pioneers, Mr. and Mrs. E. E. Caswell, who represent the finest type of early Queensland settler, and to whom the State, built largely on the grit and enterprise of our first farmers, is greatly indebted.

In the early sixties of last century cotton-growing was a subject of keen interest to Queensland farmers. Mr. Pratten, of Eight-mile Plains, grew a paddock of Sea Island cotton. The Governor (Sir Geo. Bowen), Lady Bowen, and party rode out on horseback to see the new venture. He commended the grower on the very fine crops, the bolls being exceptionally well formed, showing a long silky staple. A contest had been arranged, Miss Wright, who was living with Mrs. Pratten, proving the winner, and though only twelve years of age, she picked 120 lb. of clean cotton, receiving the congratulations of the Governor and others present for her skill and endurance. She became known as the champion cotton-picker. Mrs. E. E. Caswell (née Wright) is still active at the advanced age of seventy-nine years, and with her husband, who is ninety years of age, is living at Coburn, Wangalpong, where they are held in very high esteem. They have a family of twelve children (all living), and many grandchildren.

PLATE 93.—QUEENSLAND PIONEERS—MR. AND MRS. E. E. CASWELL, OF "COBURN," WANGALPONG.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

SHEEP ON THE ATHERTON TABLELANDS.

PROBLEMS DISCUSSED.

WHAT TO DO—AND AVOID. A TALK TO FARMERS.

By MR. W. G. BROWN, Sheep and Wool Expert, Department of Agriculture.

It is nearly three years since I visited the Tableland, and after three weeks' close inspection, lectures at various centres on the possibilities of sheep culture, especially on the lines of production of fat lambs and sheep, I found, of course, that there were drawbacks, but allowing for these, I came to the conclusion that there is no part of Queensland with better natural advantages for the business than the Evelyn and Atherton Tableland.

I have had no opportunity since then, until recently, to revisit the country and see what was being done. I have just returned after a three weeks' inspection of conditions. The weather was very unpropitious, it having rained for the whole time. Thus I was prevented, owing to the state of the roads, from making as thorough an inspection as I would have liked; yet I saw sufficient to make a clear and definite statement that I see no reason at all to change my first opinion.

At the invitation of Mr. W. A. Whiting, President of the Atherton Local Producers' Association, I delivered an address on ''Sheep on the Tablelands'' to a very good audience of farmers at Atherton on the 15th July. Below I submit the gist of what I said.

Worms and Footrot.

Before I went out on this trip I heard most alarming reports of damage done by the stomach worm and footrot; all the sheep poor and dying, &c. Now I have no doubt that stomach worms are present, but in only one case out of many I investigated did I find them seriously damaging the flock. In every holding I killed a sheep and found them quite free of stomach worms. Yet a great many of the animals were poor, miserable, and dying. I saw, also, very many poor, miserable poddy lambs, and the mortality was appalling. I saw, also, many lame sheep. On the other hand, I saw sheep, lambs, and weaners thriving as well as any sheep I know of in the same flocks as the unthrifty animals. Paradoxical, until investigation was made.

The Wrong Sheep.

In every lecture, pamphlet, or radio address I have stated definitely for years, and clearly, that Merino sheep never were nor will ever be suitable sheep for coastal areas on the Northern Tablelands.

What do I find on this visit to the Tableland? I find that thousands of Merino ewes and wethers have been bought, which have been starving in the West for many months, put on the trucks at Hughenden and other centres, arriving on the Tableland with from 10 to 20 per cent. dead in the trucks, with further losses after being put on the farms. I found that, in most cases, the sheep were old, many of them broken-mouthed and ''gummy.'' They had left very dry western country to arrive into months of rain, and grass which is never dry. Merino sheep, even when young and strong, hate going into wet grass. If they are continually on wet pasture they suffer from foot and other troubles. Naturally those who were considering sheep turned away from the proposition. Wherever I found crossbreds, they were thriving, because by their ancestry they were suitable sheep for the moist conditions. I am entitled to feel very sore when, after all my warnings, my teaching is either despised or forgotten, which is the same thing.

Soil Deficiencies.

Besides the unsuitability of the Merino as a fat sheep proposition, even in dry weather conditions on the Tableland, there is another, and, I believe, very important question to be answered.

The chief crop in Queensland is grass. The greatest production of the State, and of Australia, for that matter, is given by the pastoral business; 34 per cent. of the income tax, for instance, is paid by pastoralists.

It is well known that phosphoric acid and lime are the most important elements which enter into the production of beef, wool, mutton, butter, milk, &c. It is also known that the soils of this State, even on virgin country, are well supplied with these. Yet year after year for many decades past these essential minerals have been taken from the pastures, which take them from the soil—when they are there—and sent abroad in the various commodities produced from the land, and nothing has been or is being returned. The soil is starved, the grass is starved, and, as a consequence, the animals are starved. It is quite safe to say that the herbage is not half as nutritious as it was, say, thirty years ago. This applies particularly to the Tableland. The animals I saw on the Tableland are starving in the midst of what seems to be plenty, but isn't. The soil of the Tableland is rich, deep, and very porous. It is in consequence of this porosity that whatever amount of soluble lime and phosphoric acid be in the soil under dry conditions, they are leached down into depths where the roots of the grasses cannot reach them.

Lambing--The Wrong Time.

In winter time, too, most grasses are at their lowest in nutritive qualities, yet the Tableland sheep farmers have seen fit to time their lambing now, when the phosphates and lime, &c., are low, and the nutrition in the grass is at its lowest. No wonder the ewes are weaning their progeny prematurely. August or September are proper months here. This part of the subject could be extended to much greater length, but space does not permit. Enough has been said, I think, to point out the cause of malnutrition of the sheep I saw.

Case for the Crossbred.

Of course, it will be said that what applies to the Merino should also apply to the crossbreds. That is true, but not to nearly the same extent as in the case of Merinos. Crossbreds eat plentifully of bushes and leaves of trees, &c., which have deeper roots than grasses, and so obtain more of the soluble elements of the soil. They are, besides, more voracious eaters and not nearly as dainty as Merinos. They are, too, owing to their ancestry, accustomed to rain, snow, and wet soils. They have also far harder feet, and so do not suffer from foot troubles.

The Romney Marsh is an ideal sheep for the district, with the Border Leicester a good second. I cannot say yet whether the Corriedale will stand up to the Tableland conditions. I believe they will.

Ills—And Remedies.

It would be idle to advocate the keeping of sheep on the Tableland if remedies for such ills as are to be found cannot be given, if efficacious and reasonably cheap.

As a remedy for the lack of phosphoric acid and lime, a little should be given. Salt, 60 lb.; finely ground Nauru phosphates, 40 lb.; well mixed. Nauru phosphates contain 40 per cent. phosphoric acid and 28 per cent. lime. The sheep should also be given in the winter and spring months from 3 to 4 oz. of whole maize per day per head. This may be broadcasted on a bare place, and the animals will pick up every grain. This is a much better method than putting the maize in troughs. With the troughs the strong sheep can shoulder away the weak one and get an undue share of the rations.

The drench for worms seems to be well known wherever I have been. There is none better than the departmental drench. For other details in sheep management I would refer the farmer to "The Farmer's Sheep in Queensland and Stock Foods." These may be obtained, free, from the Department of Agriculture and Stock, on application.

How to Stock.

The trouble that has arisen caused by buying sheep without inspection or knowledge is an important factor in stocking the Tableland. It is far easier to buy 1,000 sheep than 50—the number I advise beginners to take on. Crossbreds should be acquired, as thereby three years are saved in the production of fat lambs. I am indebted to Mr. C. Harding, Atherton, for a very good suggestion in respect of that matter. His idea was that a group of, say, twenty men should club their money together and hire a thoroughly qualified man to purchase suitable sheep. As I said above, fifty sheep and one ram is quite enough to start on. It would be a trifling sum if each shared the expense of such a man. If each inspected on his own, the expenses would be prohibitive even if each were experienced. If such a group were formed I know a dozen good men in Brisbane who would take it on, at a reasonable charge.

Another important question is, "What number of sheep per acre should the Tableland farmer run on average paspalum country?" This is difficult to answer without inspection. I think five ewes per acre, if they are treated properly, are not too many on most of the country I have seen. I met one man who is running 400 sheep on 30 acres. He will not be running them long. This is an extreme case. When the farmer has had sheep for a couple of years he should have a good idea. An approximate estimate can be given by stating that one head of cattle is equal to about six sheep. The returns are £1 sterling per ewe per annum in lamb and wool, if the animals be properly cared for. This is conservative.

Mixed Farming.

I have run up near to limits of space for the present. I shall return to it later on other points of discussion.

I regret that such advice in regard to the Merino has not been taken, but I hope that this present advice on the top of the farmers' troubles will not fall on barren ground. The farmers can be assured of this—high-priced farming land cannot be profitably used without sheep. They must come to the Tableland sooner or later; I hope it will be soon. There is an empty market from Rockhampton north, which cannot be supplied adequately for years. When it is supplied then the whole world will be open for mutton, lamb, and wool. I may not see this, but it will certainly come, because it must if farming is to be profitable. "Mixed farming" with sheep as a factor should be the slogan.

THE FOREST ESTATE.

By E. H. F. SWAIN, Chairman, Forestry Board.*

I am asked to try and interest you for forty minutes in matters pertaining to the management of the Forest Estate or otherwise in Forestry, which is an industry devoted to the production and handling of the principal raw materials later to be used in the manufacture of such things as houses and buildings, tables and chairs, bedsteads and wardrobes, pianos and organs, fiddles and fifes, pens and pencils, ink and paper, artificial silks and wools, celluloid and tortoise-shell combs, toothpicks and matches, billiards and beerfroth, quinine and eucalyptus, charcoal and creosote, corn-cures and vinegar, guncotton and chloroform, collars and studs, dolls and playballs, formalin and methylated spirits, rope and bootlaces, suitcases and linoleum, leather soling and babies' dummies, corks and erasers, dyes and gums, cascara sagrada and rubra gummi, perfumes and explosives, railways and tramways, steamships and aeroplanes, cricket and golf kits, and all the other unobviously tree-born things that fill up the workaday world of to-day.

Forestry a Prime Industrial Factor.

Forestry in short and in fact is a primary producer of raw products which feed a multiplied and increasing array of other dependent industries. It is an unobvious industry because its forest factories are hidden in the bush behind the scenes of Government, as enterprises of State, and because its products and derivatives are either as obvious as air and water and other gifts of Nature or as unobvious as they can possibly be made by an utter unresemblance to their parents.,

Nevertheless, the operations and activities that are a-doing on or about the Forest Estate more than casually concern the citizen and affect even the business and doings of Real Estate, since they provide much of the wherewithal with which the business of Real Estate is conducted—to wit, the houses and buildings aforesaid, with their furnishings and panellings in Silkwood and Silky Oak and Walnut Bean, their shade trees and avenued frontages, and the very water supply which has been conserved for them by the State Forests of the mountain watersheds and conveyed to them in pipes mined with the aid of wooden props.

From the very beginning man has made his home in or of the forest.

> "When the Great Architect conceived the plan,
> To build a habitation fit for man,
> Earth was not counted perfect from His hand,
> Till streams and forests gladdened all the land.
>
> "Great forests like huge temples builded high,
> With frondent columns reaching towards the sky,
> Firm founded in the rich maturing ground,
> Their roofs with Nature's glorious verdure crowned."

But man is clever and delights to create his own heaven and earth, to paint the lily, and generally to reduce to his own ideals of economic tidiness the apparently disordered opulence of untidy Nature. Nor has he remained long content with the forest for a home. The impulse to a higher standard of living, to social betterment, to systemised hours of labour and to a systemised life seized him early in his leafy habitation of earth, and he shortly commenced to cut down the living wood of his original home as a savage or sylvager, in order to replace it with the storied wooden caves of the latter-day citydoms in which men do now congregate all the world over to the greater glory of Real Estate and the greater business of the gentlemen engaged therein.

---

*In a recent address before the Real Estate Institute.

Ante-Adamite Industry.

Man has been busy since Adam in shaving every vestige of timberland from the smiling face of earth. Within a century he will have got through the job. A hundred years from now the commercial wildwoods of the sphere will have been mopped up, and man will have settled down to his new enthusiasm of showing Nature how to farm forests, as he has shown her already how to handle corn crops of 40 bushels to the acre or more.

We get into a habit of so deploring the disappearance of the past that we perceive not the glories of the future; but the future is as inevitable as the past, and nothing can stay mankind's haste towards a man-made world, a new creation in man's image. The mysterious tangle of the natural wildwood, the forest primeval, will vanish, and in succession will come the regimented tree plantations of the State forests of the next generation, organised wood farms capable of producing a crop of 60,000 feet per acre instead of Nature's 6,000—in sixty years instead of 600—located at the point of maximum economy to the great centres of population and planned on so large and systemised a scale that a magnified logging and sawmilling operation will cut the costs of timber to the heart, and convert to varied use as derivatives the final speck of sawdust, the final head of gum, in factories stationed in the forests almost a whistle reach from the city's edge.

"Great forests like huge temples builded high" can be planned, organised, systemised, sixty years ahead, and made to yield a continuous and never-ending factory production of wooden things in very much the same way as Ford factories and sausage machines turn out Ford cars and sausages.

But the movements afoot on the Forest Estate will yet remain ever indiscernible to the public who gaze above the forest fence, because a billion Ford cars can be placed upon the road before an acre of Hoop Pine can be grown into chairs and tables.

Time the Essence of the Contract.

Time is the essence of the forest contract, and foresters, suffering the labour of creation, seldom live to enjoy the harvest time. For this reason the practice of forestry is unattended by realisable individual triumphs, and for the same reason is generally avoided by private enterprise as an investment. Thus Forestry becomes State enterprise, although by its very nature, its call for individual initiative, for courage under stress of problem and difficulty, for patience and persistence on the time aspect, it is an intensely individualistic undertaking. Thus upon Government, which becomes heir to the possession of the original wild forest lands, with the immediate responsibility for efficient marketing of the original timber stands, falls the final inevitable responsibility for management and recreation of the Forest Estate. Hence you have a Forest Department which surveys the forests, logs, and sells the product, runs State sawmills, takes timber supply contracts, and plans the organised Forest Estate of the future on lines and to an extent calculated to meet the ordinary necessities of your children's children years ahead. In these days, the per capita consumption of wood, per man, woman, and child of the Queensland population, is 100 feet of sawn softwood and 80 feet of sawn hardwood per annum, or, in all, in this year of grace, for a population of 811,200, 146,000,000 feet of sawn timber. But this population is increasing, as did that of the United States of America at our stage of development, at the rate of 2¼ per cent. per annum, so that before the new forest crops are matured in the year 1986, and thereafter there will be in Queensland 3,000,000 people, whose need in timber will be 500,000,000 odd super. feet per annum—three to four times as much as our forest resources of to-day are capable of supplying. In Brisbane alone there will be a population of nearly 1,000,000 souls, and this new and greater Brisbane will use more wood than the whole of Queensland absorbs this year.

Bigger Business in Timber.

All this means bigger business in timber, not a lesser business as argue those people who are advocating conversion of the State forests into private agricultural farms, and simultaneously enjoining a firm and hopeful reliance upon expected miracles of substitution of timber in the future by substitutes manufactured from some other and unknown base. It implies also considered timber farming activity by the State upon a scale sufficient to meet figured out requirements. In

Queensland this involves a softwood plantation scheme of from 5,000 acres a year, and a hardwood regeneration scheme of from 15,000 acres a year, representing a yearly investment of capital amounting to from £100,000. Latterly, private enterprise has entered the Australasian forestry arena as a competitor with State enterprise, following upon the discovery that *Pinus insignis* can be grown to cutting size in Australasia in twenty years instead of 120, as in the case of pines in Europe. The more rapid growth of forests in the Antipodes certainly brings forest management within reach of private enterprise, but State Forestry still holds advantage over private practice in that it already owns the most valuable natural forest lands, can borrow funds at less per cent., saves canvassing, brokerage, and other private company costs, and given equal powers of management under Government as under a private directorate, can hope to produce timber at a price to undersell private production. It is also concerned for the State as a whole, and will not wilfully overproduce. In New Zealand, some twenty odd forestry companies are in operation, and if their prospectus figures were realisable their aggregate production would cover the Pacific Ocean with a hundred times more *Pinus insignis* than could possibly be absorbed. Fortunately, however, their prospectus figures are impossible of realisation, nor does the world want a monotonous timber ration of *Pinus insignis* only. In the Queensland climate *Pinus insignis* becomes negligible as a constituent of the forest farms of the future, and other species must be availed of which are adapted to the semi-tropical environment. Queensland will grow Kauri and Hoop and Cypress Pine and Silky Oak and Maple and a variety of other distinctive species of wood for many and varied purposes, and whilst New Zealand may become purveyor in excelsis of *Pinus insignis* to the world, Queensland will become the producer of a rich range of more valuable woods, and as such become the supplier-in-chief of the Australian market for fancy woods.

Private Forestry Efforts.

Private forestry has much to learn before it can stand firmly upon its feet as a standard private investment. In California, in 1900 to 1910, there was a boom in Eucalyptus planting similar to the present Australasian boom in *Pinus insignis* planting. Some 50,000 acres of Eucalyptus plantations were established by forestry companies operating on the acre share basis. At this date, the best use to which the product has been put is firewood, and half the planted areas are now discovered to have been so uneconomically located with respect to their markets, that half of them are unworkable even for the sale of firewood.

Strange to say California borrowed Eucalyptus planting from us and gave us in return *Pinus insignis*, which in California is not seriously regarded as a timber tree, although in Australia it promises to become one of the most important ingredients of our softwood schemes.

Queensland's Wealth in Wood.

The Forest Estate of Queensland consists of 4,000,000 odd acres of State forest or other forest reservation, on which grow 400 odd different kinds of woody trees, of which around forty odd are known upon the wood market of to-day. One of the functions of a Forest Department is to know the whole 400 of its wooden ingredients, both as articles of commerce and as living things in the forest combination, in order, on the one hand, to prescribe their proper use in industry, and, on the other, their due arrangement in the artificial timber stands which the future contemplates. With regard to the first the Queensland Forest Service undertakes to identify for the industrial world any of these 400 woods of Queensland, and to prescribe suitable ones in replacement of the imported article. With regard to the second there are certain risks in silviculture which in agriculture can be met as they arise by alterations in the annual crops, but to which, in Forestry, we commit ourselves at planting time irrevocably until harvest time. Vegetation which to outward appearance is economically useless and to be cast aside may be requisite to salt an otherwise too artificialised a forest. Nature maintains an equilibrium by an apparent disregard of economy. Man may undermine Nature on top of himself by too great a regard for economy. The German foresters did this in training the primeval beech and oak forests to become pure spruce, only to discover that spruce prosperity was impermanent and involved insect infestation and butt rot. Hence the foresters' search for maximum production must be tempered by a delicate respect for Nature's judgment. In the long run, Nature knows quite a lot more than we give her credit for.

As you know, the Queensland climate is characterised by pelting summer downfalls and drawn-out winter droughts, during which the upper soils are sucked of their moisture by a prevailing high aridity. This state of affairs produces quite a different vegetative response to that of Europe, where the earth is thoroughly soaked by the cold rains of winter, and summer arrives merely to add warmth to an otherwise fecund soil. The moisture remains near the surface, the trees root shallowly, and moss and undergrowth crowd the floor, so that evaporation is retarded and the water is held by the forest as by a sponge. Contrast the Queensland position where the seeds fall upon the earth in a summer swelter between rain and shine, with only two or three months to dig in against the oncoming droughts of winter, when the upper soils are parched. Hence you have in Queensland not the shallow-rooted trees of Europe, but "dinkum" diggers which send down a tap root each into the subsoil without taking a breath, and thus duly entrench themselves against Nature. This means that only deep rooters survive and the moss and undergrowth of the soil surface are missing except in the catchment hollows where moisture congregates, and saturating the earth has an immense response under our tropical skies in the high jungles which are known to Queenslanders by the affectionate diminutive of "scrubs."

These factors decide for Queensland the type and arrangement of its forests. The softwood jungles fill the alluvial bottoms of the 30-100-inch rainfall belt fringing the long stretch of coast. They are essentially and naturally of patchy distribution standing out as softwood islands in the sea of Eucalyptian and Leguminous hardwood which alone survive on the evaporated hills and plains encompassing them.

Betwixt and between the typical open hardwood forests of Queensland and the dripping jungles where congregate the Silkwoods, the Rose Mahoganies, the Beans and the Silky Oaks, is the great hillside type of the south-eastern quarter of Queensland, the Hoop and Bunya Pine forest, which, ousted from the heavy jungle by the oppression of the full-blooded, heavy, drink-drenched jungle fancywoods, pits itself against the Eucalyptus trees of the scrub edges, battling against their shade, and gradually creeping through their canopy, eventually spreads its young shoulders above the old Ironbarks, and condemns them in turn to gradual decline and death, save when the bush fires descend upon both, and scorching the Hoop and Bunya Pines to the bone leave a borer host behind to finish them off, whilst the old Eucalypts in their greater hardihood defy both flame and worm, and put forth new green leaves, giving challenge for the thousandth time to all the forces of Nature arrayed against them.

On the Forest Front.

This then is the situation from the forest front of Queensland, where the tide of battle of Nature ebbs and flows continually and continuously. Man comes in to settle the fight to his own advantage only to discover that the taproot which the native tree develops against Nature is developed also against him, because it makes it extremely difficult for him to use it as a nursery and plantation ingredient. It refuses to lend itself to planting. Not so the docile treeling of Europe, with its shallow fibrous roots which become more shallow and fibrous under nursery treatment, and make the tree amenable to the forester in the new forest. But man is not to be beaten by a tree, and thus has evolved the Queensland equipment for transcending the taprooting difficulty by encasing the stubborn taproot in a planting cartridge.

Thus the Australian trees are being torpedoed into the forest fight of the future in a twist of tin costing a penny, which can be used over and over again. But that penny's worth took seven years to think out, and the extra-tropical world hasn't thought it out yet.

Overhauling the Deficit.

Hoop and Bunya Pines are our most important trees, providing as they do the main wherewithal for the building of homes for the greater part of our people. But the Hoop and Bunya pine forests occupy only a small quarter of South-eastern Queensland, and are almost indiscernible upon the Queensland map expanse as scattered green specks and smudges. In all they aggregate 1,000,000 acres, and there is left upon them around 1,000,000,000 feet of pine, which we are using up at present at the rate of 60,000,000 feet a year; a sixteen-year resource which, by dint of rationing and dilution, we propose to make serve for up to thirty years, when our first crops of quick-grown species are ripening to the market. Thereafter the local deficit in timber will gradually be overhauled by our plantation programme, which is worked out to provide a constant and normal wood ration for every child to be born or brought to Queensland.

Thus with the help of the unnoticed forest, the homes and businesses of Queensland will prosper, and a larger avenue of activity and service will be opened to the Real Estate Institute of the times to come.

AUSTRALIAN TOBACCO INVESTIGATION.

In August of last year the representative of the British-Australasian Tobacco Company, when giving evidence before the Tariff Board, made an offer on behalf of the company to enter into a definite arrangement with any State Government, or the Federal Government, to spend £1 for £1 up to a total of £50,000 in developing the tobacco-growing industry in Australia.

The Development and Migration Commission and the Council for Scientific and Industrial Research subsequently discussed this offer with the company, with the result that a definite proposal was submitted by the company which even exceeded the terms of its first offer.

The proposal is that over a first period of three years the company will find £20,000 rateably with the sum of £10,000 to be found by the Commonwealth and/or State Governments for the purpose of carrying out investigations and field experiments. Of the £10,000 the Commonwealth Government has agreed to provide £5,000, and it has been suggested that the other £5,000 be found by the Governments of the five mainland States—that is, £1,000 by each of the States for the three-year period.

If, at the expiration of the three-year period, developments are sufficiently encouraging to warrant further effort, and additional expenditure is considered necessary and desirable, the company will provide a further £30,000 conditionally upon the Commonwealth and/or State Governments providing a similar amount, and it is proposed that the five States referred to should contribute £15,000 jointly, or £3,000 each, to cover this second period, and the Commonwealth Government the remaining £15,000.

The Commonwealth Government and all the mainland State Governments have formally agreed to the proposals on the terms outlined.

Under the terms of the agreement, an Executive Committee to control the policy and general direction of this investigation was constituted, and it was agreed that the contributing States should nominate, say, the Directors of Agriculture, or such other officers deemed suitable, to act as an Advisory Committee.

It was a condition of the agreement that the Executive Committee should consist of a representative of the Development and Migration Commission, a representative of the Executive of the Council for Scientific and Industrial Research, and a third member to be jointly appointed by these two bodies.

The Executive now consists of Mr. H. W. Gepp, Chairman of the Development and Migration Commission; Dr. A. C. D. Rivett, Chief Executive Officer of the Council for Scientific and Industrial Research; and Dr. Darnell-Smith, Director of the Botanic Gardens, Sydney, who has had considerable experience on the scientific investigational side of the tobacco industry in Australia. The Executive has also appointed as an additional full member of the Executive the Chairman of the Standing Committee on Agriculture of the Council for Scientific and Industrial Research, who at the present time is Dr. S. S. Cameron, Director of the Victorian Department of Agriculture. It may be mentioned that all the State Departments of Agriculture are represented on this Standing Committee by their permanent heads.

The organisation of the investigation is proceeding as rapidly as possible, and already much work has been done. An economic survey of the present state of the industry is at present being made, and the results of past experiments and experiences in the industry are being closely studied.

The party conducting this survey will visit the various States and interrogate growers; the purpose of the survey, however, is merely to collect information and not to impart advice. The personnel of this party consists of a man from New South Wales and one from Victoria, together with a graduate in agriculture to undertake a general examination of soils.

It is hoped that as a result of the survey much valuable information will be obtained regarding the economic factors of the industry. A study will also be made of the varieties of leaf grown, and those which have proved most profitable, and information will be sought as to the climatic conditions best suited for their production. The nature of the damage, and the extent of the loss resulting from the ravages of blue mould and the methods employed for its prevention, will also be one of the aims of the survey. Information regarding insect pests and the nature of the damage resulting therefrom, and details of the methods employed in the curing, grading, packing, and marketing of the tobacco will also be sought, and the opportunity will be taken during the survey to invite the growers to offer suggestions for the improvement of the industry. The information obtained as a result of this survey—so far as it concerns the individual—will be treated as strictly confidential.

In addition to this economic survey of the industry in Australia, Dr. Darnell-Smith, a member of the Executive, is at present in America studying the tobacco industry in that country. His inquiries will have particular reference to the question of soils and cultural methods.

Applications are being called in Australia and throughout the world for the position of Director of Tobacco Investigations. Applicants should have had a thorough University training (or its equivalent) in plant physiology and pathology, with special experience, in some aspects at least, of tobacco growing and curing. It is not expected that any applicant will possess expert knowledge of every phase of the industry; hence the selection of a supporting staff will be deferred until the Director has been appointed. The salary offered is from £1,500 to £2,000 per annum (with travelling expenses), according to qualifications. The period of appointment will be three years, and the term may be extended.

It would appear, however, judging from letters received by the Executive from growers and from certain published statements, that there is an impression that the purpose of the funds made available under the agreement is to provide some form of subsidy or financial assistance to the industry. The Executive wish it to be clearly understood that such is not the case, and that the purpose of the Australian Tobacco Investigation, as its name implies, is to investigate the problems of the industry with a view to their solution, and so to establish the industry in Australia on a sound and stable basis.

It would appear that the first announcement of the agreement gave a decided fillip to the industry, and many inquiries have been received about the possibility of growing tobacco. It is the considered opinion of the Executive that, until the proper methods and conditions have been determined, an increase of the area at present devoted to tobacco is inadvisable. A rapid expansion of the industry at present would probably lead to much unsuitable land being devoted to tobacco culture, and to the production of much inferior leaf. Those desirous of obtaining information regarding the industry are advised to communicate with their State Department of Agriculture, who will be kept informed of the Executive's researches, and who, in the future as in the past, will continue to be the medium for imparting practical advice to growers.

The Executive is anxious that growers will heartily co-operate with it in the inquiries which it will undertake with a view to improving the conditions of the industry. At the same time, the Executive will take the obviously practical course of consulting, wherever possible and desirable, the various bodies connected with the industry, and already arrangements have been made to take full advantage of the advice and help which existing State tobacco experts, in view of their long experience, are so qualified to give.

The Executive is anxious that the investigation shall be carried out with that unanimity and good will on the part of all concerned which characterised the discussions of the contracting parties to the agreement prior to its final acceptance.

FACTS ABOUT FOOD VALUES.

M. A. WYLIE, Inspectress and Organiser, Domestic Science,
Education Department, Western Australia.*

The classification of foodstuffs was given in a previous issue of this magazine, and in the present article I would remind the reader of the oft-mentioned five groups of foodstuffs, viz., proteins, carbohydrates, hydrocarbons, minerals, and other substances sometimes called nutrients or vitamines. Foods from each of these groups help to make meals well balanced and appetising.

Summarising, we may say the work of food is—

(*a*) To build new tissues and repair old ones;
(*b*) To furnish heat and energy for work and play;
(*c*) To regulate the machinery of the body in order to ensure normal growth and health.

The proteins, such as albumens (found in meat, milk, and eggs), are the builders and repairers of tissue. The carbohydrates, such as starchy material and sugars (found in grains and fruits), supply material for the production of energy, whilst hydrocarbons (fats) give warmth, and, under certain conditions, energy. The minerals, such as iron, calcium, and phosphorus, obtained from the outer coats of grains, also from vegetables and fruits, are required for teeth, bones, blood, and tissue generally. Vitamines have a large share in keeping up the normal growth and health of the body.

---

* In the "Journal of Agriculture," W.A., for June.

The material called roughage also plays an important part amongst the foods of the body. This is the bulky part supplied along with certain foods, such as the outer coverings of grain, as bran, or the cellulose or framework of leafy vegetables such as cabbage. Roughage helps to keep the food moving in the digestive tract, acting also as a conveyor of food materials. Bran does this as well as providing nutriment in the form of gluten and minerals.

Insufficient food, and food supplied in wrong proportion and variety, have a deleterious effect upon the body, especially upon that of the growing child. The shape and appearance of the body is affected, the mentality more or less weakened, and a general state of debility is the result.

Good nutrition shows itself in well-developed frame, straight back, legs and ankles, strong teeth, clean tongue, sweet breath, firm flesh with healthy colour, sparkling eyes with clear whites, glossy hair, and energetic attitude towards life in general, and a keen appetite for simple food. Proper food selection is therefore something that everybody needs to understand.

In planning meals always make the best possible use of fresh fruits, vegetables, and meats, avoiding the canned variety as much as possible, as the essential vitamines are more or less destroyed in the process of preservation.

To have attractive, pleasing meals it is necessary to plan how different textures and flavours, and sometimes even colours of foods combine. This is not a merely epicurean practice, for we are more likely to eat the right foods if they please eye and nose, and tongue as well. Hence in your meals have foods of different texture: some hard, some soft; some crisp; some juicy. It is good to remember sometimes that the use of left-overs is false economy of health and time, and even of materials, if it requires undue quantities of fresh supplies to make the former palatable.

The quantity of food as well as the quality of food for each person is of paramount importance; the growing child, or rather the adolescent, requires as much as the adult. Those engaged in heavy physical work require more than those of sedentary occupations. Again, temperature alters conditions and needs; cold climates demanding more than warm.

One of the best ways to estimate the quantity of food needed by a person or family is in terms of calories.

There is nothing mysterious about this term; it is simply the unit of measure of heat or fuel value. As the thermometer shows intensity of heat, the calorimeter shows the amount of heat; the first is measured by degrees, the latter by calories.

There are many tables published of the different foods—classified according to their heat or energy-producing value in calories. The following table is culled (and simplified) from the latest American authorities:—

Proteids:
- Milk (1 quart) gives 600 calories.
- Skimmed milk (1 quart) gives 300 calories.
- Beef (1 lb.) gives 1,000 calories.
- Poultry (1 lb.) gives 500 calories.
- Fish, fresh (1 lb.), gives 200 calories.
- Cheese (1 lb.) gives 2,000 calories.

Carbohydrates:
- Bread (1 lb.) gives 1,200 calories.
- Bread, whole wheat (1 lb.), gives 1,600 calories.
- Shredded meal (1 lb.) gives 1,650 calories.
- Oatmeal (1 lb.) gives 1,800 calories.

Sugars:
- Honey (1 lb.) gives 1,500 calories.
- Granulated sugar (1 lb.) gives 1,800 calories.
- Milk chocolate (1 lb.) gives 2,250 calories.

Hydrocarbons:
- Butter (1 lb.) gives 3,400 calories.
- Oil (1 lb.) gives 4,100 calories.
- Cream, 40 per cent. (1 lb. or 1 pint), gives 1,700 calories.
- Bacon (1 lb.) gives 2,600 calories.
- Salt pork (1 lb.) gives 2,850 calories.
- Almonds, shelled (1 lb.), gives 2,900 calories.
- Walnuts, shelled (1 lb.), gives 3,200 calories.

Vegetables (fresh):
Asparagus (1 lb.) gives 100 calories.
Lima beans (1 lb.) gives 550 calories.
French beans (1 lb.) gives 175 calories.
Beets (1 lb.) gives 150 calories.
Cabbage (1 lb.) gives 100 calories.
Carrots (1 lb.) gives 150 calories.
Cauliflower (1 lb.) gives 150 calories.
Tomatoes (1 lb.) gives 100 calories.
Green peas (1 lb.) gives 250 calories.
Dried peas (1 lb.) gives 1,600 calories.
Potatoes (1 lb.) gives 300 calories.

REPAIRING WOOD FENCES.

Inserting new rails or posts in a fence is a troublesome job. An ordinary farm post and rail with no pales is comparatively easy, and there are ways of putting in a new rail with a minimum loss of time. "Farm, Field, and Fireside" in the accompanying illustration shows means of carrying out this work as expeditiously as possible. For instance, the rough-and-ready way is to fit one end into its corresponding mortise, cut it the right length to go through the mortise at its other extremity, and chop it to an elongated point A (Fig. 1). This end is pushed through its mortise far enough to allow the rail to be driven back into its first or original bed. This weakens the rail and has not a good appearance. A better way is to loosen the post and push it back (Fig. 1) until the new rail can be got in; to effect this it may be necessary to ease the mortise somewhat with a chisel. Then the post is set up again.

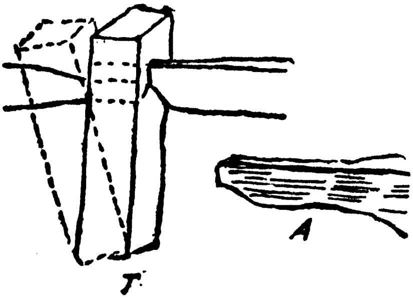


Fig. 1.

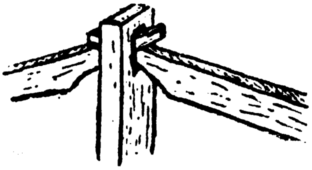


Fig. 2.

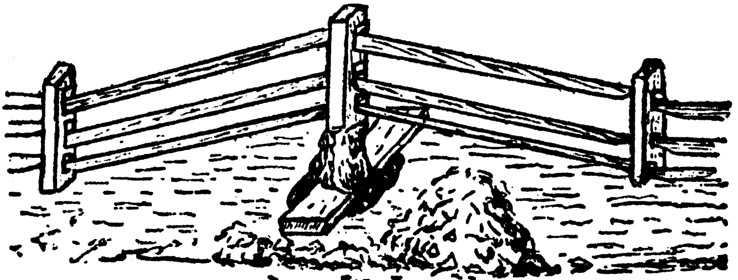


Fig. 3.

A broken post is renewed thus:—The old one is dug out and split to allow the rails to be released. The mortises in the substitute are made a little larger (say ¼ inch each way) than the old ones, and the rails are inserted whilst the post is loose. The latter is then pushed into place and rammed.

Fig. 3 shows a better way. The faulty post is dug out. A plank is laid over the hole, and the new post previously mortised is stood on the plank and the rails are introduced as shown, any easement required being effected with a chisel. The plank is withdrawn and the post sinks into the hole. This method is not likely to split the post when adjusting the rails.

General Notes.

Arrowroot Board.

An Order in Council has been approved empowering the Arrowroot Board to give to the Commonwealth Bank the necessary security required by that bank for financial assistance rendered to the Arrowroot Board from the Rural Credits Branch.

Queensland Cane Growers' Council.

By Regulation under the Primary Producers' Organisation and Marketing Act power has been given to any member of the Queensland Cane Growers' Council, if he be unable to attend any meeting of the council, to appoint a deputy to take his place at such meeting.

Egg Board Levy.

By regulation made under the Primary Producers' Organisation and Marketing Act, His Excellency the Governor has removed the necessity for the Egg Board to obtain the authority of the Treasurer before operating on its Trust Account, into which the proceeds of the Egg Board Levy are paid.

Atherton Tableland Maize Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Act empowering growers of maize to withhold from delivery to the Atherton Tableland Maize Board in any one year not more than 5 tons of the commodity for food for their families and/or live stock and for use as seed.

Broom Millet, Peanut, Cotton, and Egg Boards.

Orders in Council have been approved inserting in previous orders, re the financing of the above Boards by the Commonwealth Bank, a further paragraph. This paragraph provides that any security shall cover future crops of the commodity concerned as well as the crop in existence at the time the security was given.

Cane Levy—Maryborough District.

In previous Regulations issued under the Primary Producers' Organisation and Marketing Act, the Maryborough District Cane Growers' Executive was empowered to make a levy on suppliers to the Mount Bauple Central Mill at the rate of ½d. per ton of cane delivered to that mill. The amount of the levy has now been fixed at the rate of ¾d. per ton. This alteration has been made by an amending regulation.

The Diabolo Separator.

The Diabolo separator is now offered in six sizes, from 10 gallons up to 115 gallons, containing all worthwhile modern improvements. The fact claimed that for many years a greater number of separators has been manufactured in the Diabolo works than in any other separator factory in the world demonstrates its efficiency as part of a modern dairy farm plant. More than 1,000,000 machines of this type have been manufactured, and the yearly output is now 100,000 separators going out to every dairying country in the world. The Australian and New Zealand business shows a continued steady increase. The demand to-day is for higher efficiency in every department of industry, and only those separators that are proved by test to be exhaustive skimmers under everyday dairy conditions can survive on the market. The Diabolo is one of these. An agency has been established in Brisbane, and fuller particulars of their enterprise may be found in our business pages.

Influences of an Agricultural Life.

''No one doubts that our national life would be the poorer by a decline in our rural life; but it is sometimes difficult to state in definite terms the extent of the loss,'' comments Professor Strong, of the Leeds University. ''It is well known, however, that contact with the soil leads to an appreciation of nature and natural phenomena, which it is difficult, if not impossible, to obtain in any other way,'' he adds. ''History and literature and art have shown throughout the ages that daily contact with the elemental forces of nature breeds independence of character, virility of mind, constancy of purpose—qualities included among those accounted worth while in life. And if perchance at times these are allied with other and less desirable accompaniments, the latter, more often than not, are attributable to causes which a well-organised national life could remove or control.''

Mackay Sugar Levies.

Regulations were approved on the 23rd July empowering the various District Canegrowers' Executives to make levies on sugar-growers in Queensland. The levy to be paid by suppliers to the Mackay sugar mills was approved to be at the rate of 2d. per ton of cane delivered, but the Regulations have now been amended providing that the levy, in so far as the Mackay mills are concerned, shall be at the rate of 1d. per ton of cane delivered.

Levies by Sugar Mill Suppliers' Committees.

The following Mill Suppliers' Committees have been empowered, by Regulation, to make levies at the rates mentioned opposite the names of such Committees:—

Hambledon Mill Suppliers' Committee—one farthing;
Pleystowe Mill Suppliers' Committee—one penny;
Tully Mill Suppliers' Committee—one farthing

per ton of cane delivered to the Hambledon, Pleystowe, and Tully Mills respectively, during the season commencing 1st May, 1927, and ending on 28th February, 1928. Provision is made, however, for the taking of polls in connection with such levies, if demand for such polls is made by at least eighty growers concerned. The amounts of the levies shall be used as follows:—In the case of Hambledon, for the purpose of defraying administrative expenses of the Hambledon Mill Suppliers Association; in the case of Pleystowe, for the purpose of defraying expense of a check weighman; and, in the case of Tully, for administrative and other minor expenses of the Mill Suppliers' Committee.

Wheat Board Election.

Nominations for the election of five members to the State Wheat Board:

District No. 1.—(1921 Electorates of Maranoa, Dalby, Nanango, and Murilla, with the exception of the Goondiwindi Division), Robert Swan, Wallumbilla (returned unopposed).

District No. 2.—1921 Electorate of Pittsworth), Arthur Carl Krieg, Brookstead (returned unopposed).

District No. 3.—(1921 Electorates of Warwick, Carnarvon, and the Goondiwindi Division of Murilla, and the Warwick and Killarney Divisions of the Cunningham Electorate), Alexander N. Allen, Campbell's Plains; Bergittinus C. C. Kirkegaard, Freestone.

District No. 4.—(1921 Electorate of Cunningham, with the exception of the Warwick and Killarney Divisions), Thomas Muir (returned unopposed).

District No. 5.—(Old Electorates of Lockyer, Drayton, Aubigny, Toowoomba, and East Toowoomba), John Archibald, Oakey; Patrick McNee, Kingsthorpe.

Proposed Honey Pool.

A poll to decide the question of the constitution of a Honey Pool, to include all owners of five hives of bees and over, was taken at the Department of Agriculture and Stock, Brisbane, recently, with the following results:—

For the setting up of a Honey Board ..	171 votes (55.5 per cent.)
Against the setting up of a Honey Board	137 votes

As the necessary two-thirds majority was not secured, the proposal was therefore defeated.

Alternative proposals for a poll to comprise only owners of fifteen hives of bees and over, and thirty hives of bees and over, respectively, were also submitted to growers, and in both cases the necessary majority was not obtained.

The voting of the proposals was as follows:—

Owners of fifteen hives of bees and over.

For the setting up of a Honey Board ..	128 votes (59.5 per cent.)
Against the setting up of a Honey Board	87 votes

Owners of thirty hives of bees and over.

For the setting up of a Honey Board ..	86 votes (60.5 per cent.)
Against the setting up of a Honey Board	56 votes

Proposed Queensland Maize Board.

The counting of votes in connection with the proposed Maize Board was conducted at that Department on 6th August, with the following results:—

For the setting up of a Maize Board ..	1,924 votes	(37.4 per cent.)
Against the setting up of a Maize Board ..	3,225 votes	(62.6 per cent.)
Informal and incomplete ..	115 votes	
	5,264 votes	

The details of the voting on this question are given hereunder:—

District.	For.	Against.	Total.	Informal and Incomplete.
No. 1 (Moreton)—5,847 growers	405	1,448 78·1 per cent. against	1,853	37
No. 2 (Darling Downs and Maranoa)—4,880 growers	738	1,492 66·9 per cent. against	2,230	49
No. 3 (Rest of Queensland, except Atherton District) 4,113 growers	781	285 73·2 per cent for	1,066	29
	1,924	3,225	5,149	115

Mr. C. Sheehy, of the Council of Agriculture, and Mr. F. T. Keable, of Tannymorel, were present at the counting of the votes.

The Royal Society of Queensland.

The ordinary monthly meeting of the society was held in the Geology Lecture Theatre on Monday, 28th July.

The President (Professor E. J. Goddard) was in the chair.

The President referred to the death of Dr. Taylor, a trustee of the society, and extended sympathy to his relatives.

The President announced that the society had been represented on a deputation in connection with the proposed open season for native bears, and that there was no need for further action on the matter at this meeting.

Dr. F. W. Whitehouse exhibited a collection of carboniferous corals from the Lion Creek Limestone, near Stanwell. These included *Syringopora syrinx* Eth. fil., *sp. nov.*, **Michelinia sp.*, **Palæosmilia retiformis* (Eth. fil.), *Amygdalophyllum inopinatum* (Eth. fil.), *Lithostrotion columnare* (Eth. fil.), and **Petalaxis sp. nov.*, the species marked with an asterisk being new records. He suggested that the coral limestones interbedded in the Lower Carboniferous mudstones at many localities in Eastern Australia were all on much the same horizon, that horizon being the equivalent of D_2 in the European zonal succession.

Dr. W. H. Bryan read a paper by Professor H. C. Richards and himself entitled ''Volcanic Mud Balls in the Brisbane Tuff.'' The paper dealt with a very unusual form of volcanic ejecta in the form of spheroidal pellets of concentric structure found by the authors at Castra, on the Tingalpa Creek, 12 miles east-south-east of Brisbane. The only closely similar volcanic product seems to have been formed by the eruption of Taal Volcano in the Philippine Islands in 1911. This was described by Pratt, whose explanation of the spheroids as the result of condensation of the mud balls above the volcano in much the same manner as in the formation of summer hail. Professor Richards added some comments on the paper, which was discussed by Drs. E. O. Marks and F. W. Whitehouse, Messrs. Dormer, Tommerup, Herbert, Denmead, Morwood, Professor Parnell, and the President.

Professor Parnell then took the chair, and a lecture on ''Bunchy Top of the Banana,'' illustrated by specimens and lantern slides, was delivered by Professor Goddard. He dealt with the history of the disease in Australia from its introduction from Fiji to the present, described the symptoms, methods of investigation of the problem, and the treatment. It was pointed out that all members of the genus *Musa* are susceptible, including the wild bananas of North Queensland. A vote of thanks to the lecturer was moved by Mr. Longman and seconded by Professor Richards, but, owing to the lateness of the hour, no discussion of the paper took place.

Fish and Mosquito Control.

Success of experiments to exterminate malaria mosquitoes in Italy and Spain by the use of an American fish called "gambusia" introduced into those countries, is reported by the Bureau of Fisheries, of the Department of Commerce, U.S.A.

The experiment was attempted several years ago, when a shipment of gambusia was made from the United States to Europe to wage war against malaria mosquitoes in certain parts of Italy and Spain.

The original shipment of fish was sent to Spain, from which a number were sent to Italy. Their activities against the mosquito in that country were so successful that the gambusia have now been distributed over many parts of Italy, and have been introduced from that country, either directly or indirectly, into Germany, Russia, and Yugoslavia.

The original shipment of gambusia was placed in a pond in Spain, where they multiplied very rapidly. A year after their introduction in that country, several hundred were placed in the Lago di Porto, in Italy, a body of water which had been swarming with mosquito larvæ. It is said that a specimen of this larvæ is now rarely seen about the lake.

It is stated by an Italian scientist that complete mosquito control is obtainable with gambusia if there is complete control of vegetation in the infested region. Vertical vegetation, he said, leaves to gambusia the possibility of complete destruction, while horizontal vegetation often prevents efficient control. The reduction to a minimum of mosquito breeding without the use of a drop of petroleum is reported for extensive areas in Italy, a result never before obtained.

Staff Changes and Appointments.

Mr. J. C. Lamont has been appointed Trappers' Representative on the Moreton Opossum Board during the absence of Mr. G. W. Martens.

Mr. R. Veitch, Entomologist in Chief, Mr. J. H. Simmonds, Plant Pathologist, and Mr. A. A. Girault, Assistant Entomologist, have been appointed Inspectors under the Diseases in Plants Acts.

Mr. J. Bishop, of Beaudesert, has been appointed Inspector of Stock, and will be stationed at Ravensbourne.

Messrs. L. D. Carey and R. J. T. Kidd, Inspectors of Stock at Emerald and Mackay, respectively, have been appointed Collectors of Royalty in connetion with the Animals and Birds Acts, *vice* Messrs. E. J. Tannock and S. J. Monaghan respectively, transferred.

Mr. Norman James, of Cedar Creek, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

Mr. P. Kirwan, of Mackay, has been appointed Cane Growers' Representative on the Farleigh Local Sugar Cane Prices Board, vice Mr. A. S. Hamilton, resigned.

The following have been appointed Officers under and for the purposes of the Animals and Birds Acts:—

P. Rumball, Poultry Instructor, Department of Agriculture and Stock, Brisbane;
John Archer, Malchi;
E. C. House, Torilla Station;
M. P. Mallon; and
P. J. Ryan, of Dugandan Homestead, Boonah.

The services of Mr. J. C. Pryde, as Temporary Inspector of Stock, Toowoomba, have been continued from 13th August, 1927, to 20th September, 1927.

Mr. N. C. Copeman, of Toowoomba, has been appointed an Inspector of Stock.

The Officer in Charge of Police, Dalby, has been appointed Acting Inspector of Stock at Dalby.

Mr. A. E. Pascoe, of Yeppoon, has been appointed Honorary Inspector, Diseases in Plants Acts.

Messrs. H. Walker (Mount Glorious) and A. G. Maddox (Tarome, viâ Kalbar) have been appointed Officers under and for the purposes of the Animals and Birds Acts.

Mr. G. A. Currie, Assistant Entomologist, Cotton Section, previously attached to the Callide Cotton Research Farm, Biloela, has been transferred to Brisbane.

Mr. S. M. Watson, Assistant to Entomologist, at present attached to Brisbane, will be transferred to Stanthorpe, as from the 13th August, 1927.

Sugar Mill Suppliers' Committees.

Approval has been given to the Queensland Cane Growers' Council to appoint the following members to complete the representation of the Mill Suppliers' Committees below mentioned:—

Maryborough Mill Suppliers' Committee, J. C. Kinbacker, Bidwell, via Maryborough;

Bingera Mill Suppliers' Committee, Mr. O. Peterson, Pine Creek, Electra, Bundaberg;

North Eton Mill Suppliers' Committee, Mr. C. H. C. Ross, Eton, Mackay, Mr. W. Leeson, Eton, Mackay;

Cattle Creek Mill Suppliers' Committee, Mr. T. Etwell, Kowari Siding, Hatton Line, Mackay; and

Hambledon Mill Suppliers' Committee, Mr. W. Thompson, Edmonton, via Cairns.

Sugar Mill Suppliers' Committees—Regulation Rescinded.

Regulation 125 under the Primary Producers' Organisation and Marketing Act with regard to the official roll for the purpose of election of Mill Suppliers' Committees and District Cane Growers' Executives has been rescinded, and for Regulation 125 the new Regulation provides that the official roll for the purpose of the election shall embody—

(*a*) The latest roll of suppliers to each mill as obtained from the Central Sugar Cane Prices Board;

(*b*) A supplementary roll compiled by the mill and certified to by the Secretary of the Mill Suppliers' Committee;

(*c*) The name of any person whose name is not included in (*a*) or (*b*) who forwards a statutory declaration that he has an area of not less than five acres of cane, and is a bona fide supplier to the named mill.

Sugar Levies.

By regulations made under the Primary Producers' Organisation and Marketing Act, the Queensland Cane Growers' Council has been empowered to make a levy at the rate of ¾d. per ton of cane harvested during the season ending on the 29th February, 1928. This levy will be utilised for administrative purposes.

The Cane Growers' Council is also empowered to make a further levy at the rate of 1d. per ton of cane harvested during the season ending on the 29th February, 1928, such levy to be utilised for the purpose of creating an advance fund for the sugar industry. Provision is made, however, for a poll to be taken as to whether the levy shall be made if a request for such a poll is made by at least 100 growers of sugar-cane on or before the 23rd August, 1927.

All District Cane Growers' Executives constituted under the Queensland Cane Growers' Council are also empowered by these Regulations to make levies on growers of sugar-cane supplying cane to the mills represented on such Cane Growers' Executives, such levies to be expended only in the interests of District Executives and Mill Suppliers' Committees for administrative purposes, in the supply of stationery, stamps, &c., and other minor incidental expenditure. These levies range from ¼d. to 2½d. per ton of cane supplied.

Provision is made for the taking of a poll on the question as to whether any of these levies shall be made. In addition to the levies by District Cane Growers' Executives, the Bundaberg District Cane Growers' Executive is empowered to make a levy at the rate of 1d. per ton of cane delivered by the Booyal Branch of the Isis Central Mill Suppliers' Committee, and a levy at the rate of 1½d. per ton of cane delivered by the Pialba District Branch of the Isis Central Mill Suppliers' Committee to the Isis Central Mill, the amount of such levies to be respectively expended only in the interests of the branches for the purpose of financing the local organisation work, payments for hire of halls, &c.

The Southern District Cane Growers' Executive is also empowered to make an additional levy at the rate of 1¼d. per ton of cane delivered to the Moreton Central Mill and ½d. per ton of cane delivered to the Rocky Point Mill, the proceeds of such levies respectively to be used for the purposes only of the Moreton Mill Suppliers' and the Rocky Point Mill Suppliers' Committees. Polls may also be taken in connection with these additional levies.

Department of Agriculture and Stock,
Brisbane, 1st September, 1927.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Primary Producers' Organisation and Marketing Act of* 1926," been pleased to make additional Regulations to the following effect.

W. FORGAN SMITH.

Cotton Board Levy.

184. Subject to the following proviso, the Cotton Board is hereby empowered to make on all growers delivering seed cotton to ginneries a particular levy at the rate of ⅛d. per lb. of cotton so delivered as from 1st January, 1927, to 31st December, 1931, provided that if at least 100 growers of cotton who delivered seed cotton to ginneries during the years 1926 or 1927, on or before the third day of October, 1927, make, in writing to the Minister, a request for a poll on the question of the levy proposed to be made in respect of the cotton so delivered, a poll of such growers shall be held by the Under Secretary, Department of Agriculture and Stock, and, if upon such poll the majority of votes is against the making of such levy, such levy shall not be made.

185. The amount of such levy shall be deducted by the Cotton Board from payments due by that Board to cotton-growers as above described, and shall be paid by the manager of such Board into a Capital Fund, to be expended only in effecting any object which may be in the common interest of cotton-growers determined by the Cotton Board.

186. Any person who commits a breach of either of the above Regulations (Nos. 184 and 185) shall be guilty of an offence, and shall be liable to a penalty not exceeding five pounds.

Department of Agriculture and Stock,
Brisbane, 1st September, 1927.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Primary Producers' Organisation and Marketing Act of* 1926," been pleased to make additional Regulations to the following effect.

W. FORGAN SMITH.

Mossman Mill Levy.

180. Subject to the following proviso, the Mossman Mill Suppliers' Committee is hereby empowered to make particular levies on primary producers in the sugar-growing industry and operations in the following locality, that is to say:—

> The lands assigned to the Mossman Mill under "*The Regulation of Sugar Cane Prices Acts*, 1915 *to* 1922"—

at the following rate, that is to say:—

> Fourpence per ton on all sugar-cane delivered from the locality above referred to—

during the period commencing 1st May, 1927, and ending on the 29th February, 1928: Provided that if at least seventy primary producers in such industry and operations as aforesaid in the locality constituted by the lands assigned to the

Mossman Mill on or before the Twenty-seventh day of September, 1927, make, in writing to the Minister, a request for a poll on the question of the levy proposed to be made in respect of the sugar-cane delivered at such mill, a poll of all primary producers in such industry and operations as aforesaid in the said locality shall be held by the Under Secretary of the Department of Agriculture and Stock, and if upon such poll the majority of votes is against the making of such levy, such levy shall not be made.

181. The amount of every such levy shall be deducted by the manager of the Mossman Mill from the cane payments due by such mill to sugar-cane growers in the locality constituted by the lands assigned to such mill, and shall be paid by the said manager to the Secretary of the Mossman Mill Suppliers' Committee, which shall utilise same for administrative purposes in connection with the conduct of an office and payment of a Secretary and Paymaster for the harvesting of the cane of suppliers to the Mossman Mill. The amount of such levy shall be deducted from all cane supplied during the preceding month, and shall be paid not later than the fifteenth day of the succeeding month.

182. The Secretary of the Mossman Sugar Mill Suppliers' Committee shall furnish to the Minister, not later than the 31st March, 1928, an audited statement setting out in detail the receipts from such levy and the disbursements therefrom.

183. Any person who commits a breach of any of these Regulations (Nos. 180 to 182 inclusive) shall be guilty of an offence, and be liable to a penalty not exceeding five pounds.

A GARDEN STILE.

This illustration depicts a stile suitable for placing over fences adjoining home paddocks. Hard or soft wood, 3 inches x 1½ inch, would be suitable for the sides, 3 inches x ¾ inch for the steps, and 6 inches x 1 inch for the top. The height of the stile should be sufficient to clear the top wire of the fence. The cross stays to keep the legs from spreading should be made of 3 inches x 1 inch hardwood, and the whole structure will be strengthened if these are fastened through by long ½-inch bolts. These must be put on after the stile has been placed in position. The width of the stile may be 18 inches to 2 feet. An upright of 2 inches x 1 inch projecting 2 feet 6 inches above the top serves as a hand rail. Planed timber should be used, and finished with two coats of white paint.—"Australasian."

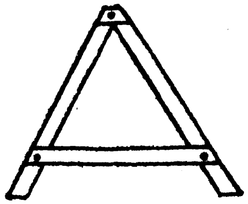


Fig. 1.

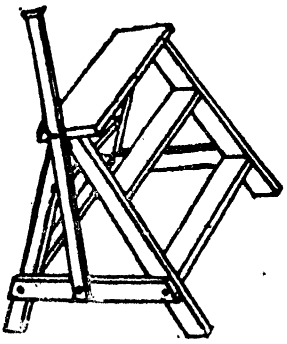


Fig. 2.

Banana Plant Prohibition applied to Goomboorian

A Proclamation has been issued under the Diseases in Plants Acts prohibiting the introduction of banana plants into the Goomboorian district.

The Three D's.

Three things are mainly responsible for the prolific breeding of bacteria in the milking shed, those being dirt, damp, and darkness. Often with little expense the necessary alteration can be made, and sunlight made available for purifying the shed. So great is the value of sunlight that many medical men advocate the sunbathing of wounds as a destroyer of germs and as a curative agent. What sunlight can do in the killing of bacteria in wounds it can do in slaying their fellows in your milking shed. The concrete-floored shed, kept scrupulously clean, open to the sunlight, will be the shed from which the cleanest supplies of the factory are drawn.

Butter Board Election.

Following is the result of the ballot for a Northern Representative on the Butter Board:—

William James Sloan (Malanda)	166 votes
Walter Scott (Peeramon)	131 votes
Wilfred Alexander Johnston (Ravenshoe)	75 votes
James Reed (Malanda)	47 votes
Informal	4 votes

Mr. Sloan will, therefore, be appointed, and will hold office until the 18th February, 1928.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

Erection and Care of Farm Buildings.

At a recent farmers' meeting at Beetaloo Valley, South Australia, a local farmer, Mr. H. C. Cook, read a paper on this subject. The buildings, he said, had a very important bearing, both mentally and physically, on the lives of the people on the farm. Care should be taken to erect them in convenient positions, and have them of useful design, when unnecessary work would be avoided. In designing the house, most attention should be given to comfort. In most districts there should be as much veranda as possible around the house to protect the walls from rain and sun. Particular attention should be given to the kitchen and washhouse. A pantry and bathhouse should be included, if possible, also a cellar and underground tank. He also advised farmers to use septic tanks; they gave complete satisfaction and would last a lifetime. The implement shed should be constructed of stone with an iron roof. The roof should be as high as possible, and the shed would then be much cooler during the summer months. The blacksmith's shop could be placed under the same roof. The stable should have stone walls with a straw roof. Cement concrete should be used for the floor of the chaffhouse. He would also arrange to have a circular saw work off the same engine as the chaffcutter, and construct a small shed in which to keep the firewood. Galvanised iron could be used for the protection of hay against mice. Concrete, with timber along the top, could also be used for the same purpose. The cowshed should be separate from the horse yards, and should consist of a spacious yard and comfortable shed. The pigsty should also have a large run and dry shed which was easy to clean, and should be placed at a distance from the house. The barn should be mice and rat proof. If it was built of stone it should be flushed with cement and have a concrete floor. It could also be made rat-proof outside by placing timber around the walls near the roof, with a 6-in. flange of galvanised iron on top. A window or two could be built above the timber. A good discussion followed.

Cheese Board Election.

Cheese Board Election results—

	Votes.
Henry Thomas Anderson, Biddeston	628
William Thomas Harris, Toowoomba	523
David Gabriel O'Shea, Southbrook	502
Alfred John Harvey, Pittsworth	468
George Burton, Cambooya	395
Mads Peter Hansen, Malling, Maclagan	387
William Dearling, Oakey	378
Albert George Tilley, Rosehill, S. and W. Railway	363
Thomas Dare, Woodleigh	295

The first five, together with the Director of Marketing, will therefore be appointed, and they will hold office throughout the term of the Board, which is for a period of three years as from the 1st August, 1927. Should any vacancy occur in the elected members of the Board it is to be filled by election by the growers, and the person so elected will hold office until the expiration of the term for which his predecessor would have held office.

Safety in Silage.

Every wheat-grower should keep a flock of sheep to assist in the effective working of the farm. The number of sheep carried will depend upon the country and the locality, but to carry the maximum number he should put down two or more 100-ton pits of silage—either wheat, oats, or barley can be used. If this is done it greatly assists in the economical working of the farm; and sufficient sheep can always be carried to make use of the stubble and rubbish growing on the fallows without the necessity for keeping a large area of grass as a reserve in case of a drought year.

The making of silage can be fitted into the operations on a wheat farm without interfering unduly with the production of hay or grain. When it is intended to produce either hay or grain, seed must be sown at such a time as will ensure that the crop will be ready to harvest when the weather is suitable for the purpose; it would be disastrous to sow too early. Silage, however, may be made equally as well in June as in October, or in any other month; and thus crops intended for silage may be sown before the hay or grain crop, and cut and pitted before haymaking is commenced.

Under present conditions, it is hardly possible for many wheat-farmers to carry more than a few sheep profitably, as the natural grasses of their holdings are not sufficient, even when helped by the wheat stubble, to provide feed for any length of time. There is no great inducement for a farmer to grow crops specially for feed when he knows that he will have to wait until the crops are ready before he can buy; and that he will then have to pay such a high price, because of the number of other farmers in the same position, that he will not be recompensed for the cost of growing the crop.

It is undeniable that a better system of rotation is required in the wheat areas of this State (N.S.W.) than the almost universal wheat and bare fallow. Sound as the practice of fallowing is, the adoption of it as the sole rotation with wheat will, within a very few years, so reduce the supply of humus in the soil that the yields of wheat will no longer be profitable. Such a condition is already arising in many soils, and will become more pronounced as time passes. In this country, where the rainfall is so uncertain, one of the most important constituents of the soil is humus; because it is one of the prime factors in helping the soil to retain moisture for a long period, and even the best fallowing will not yield good results in its absence.

The only practical means of restoring or maintaining a good supply of this invaluable constituent, other than allowing the land to lie out in grass for a long period, is to grow upon it, in rotation with wheat, a crop which can be fed down by sheep. The remains of the plants left by the sheep, and their excrement, become humus, and thus give to the soil the desirable moisture-retaining character.

The conservation of silage will enable the farmer to adopt such a rotation with greater certainty that he will make a good direct profit from his green crops, and also a larger indirect one, because he will be in the position of being able to stock his land to its full capacity. Unless a reserve of fodder is held it is unsafe to increase his flock, as the green crops may fail to grow at the expected time, owing to the absence of rain.

Moreover, a full silage pit enables him to lamb his ewes with certainty. Should a dry season threaten at the mating time, he need not be afraid to join the rams in the usual way.—A. and P. Notes, N.S.W. Dept. Ag.

Answers to Correspondents.

BOTANY.

Selections from the outward mail of the Government Botanist, Mr. C. T. White, F.L.S., which are of general interest.

Mangroves.

A.M., Sydney, N.S.W.

The negatives of Bruguiera and Ceriops returned by you came safely to hand. I am glad they proved of service to you. Many thanks for the slide of *Rhizophora mucronata* from the negative taken by Allan McCulloch. I got a splendid photograph the other day of Ægiceras showing the root system, but this, I understand, you already have. One can see all these and other mangroves within a few miles of Brisbane. I am collecting photographs with the idea of publishing an article on the mangrove flora of Moreton Bay.

Specimens Identified.

Inquirer, Brisbane—

The specimens from Atherton were very fragmentary; but, as far as the material allows, have been determined as follows:—

No. 1.—Leaves only. Impossible to determine.

No. 2.—*Stenocarpus reticulatus.*

No. 4.—*Darlingia ferruginea.* This tree is only known botanically from the leaves. It would be most interesting to obtain complete material—flowers and fruit.

No. 5.—*Cupania serrata* (?). Family *Sapindaceæ.*

The specimens collected by Forest Assistant Rankin at Yarraman have been determined as follows:—

84.—*Bursaria incana.*
85.—*Acronychia lævis* var. *purpurea.*
86.—*Eucalyptus eugenioides.* White stringy-bark.
87.—*Elæodendron australe.*
88.—*Celastrus australis.*
89.—*Sicyos angulata.*
90.—*Acacia glaucocarpa.*
91.—*Acacia Cunninghamii.*
92.—*Nephelium connatum.*
93.—*Canthium latifolium.*
94.—*Canthium buxifolium.*

Farm and Garden Notes for October.

Field.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

Kitchen Garden.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 feet apart with 18 inches between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn.

and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE COASTAL DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering, as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS

Much of the matter contained under the heading of "The Coast Districts" applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1927.	SEPT.		OCTOBER.		MOONRISE. SEPT.	Oct.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.8	5.36	5.34	5.50	a.m. 8.56	a.m. 8.36
2	6.7	5.36	5.33	5.51	9.26	9.15
3	6.6	5.37	5.32	5.52	10.0	10.1
4	6.5	5 37	5.31	5.52	10 38	10.53
5	6.4	5.38	5.29	5 53	11.20	11.49
6	6.2	5.38	5.28	5.53	p.m. 12.9	p.m. 12.48
7	6.1	5.39	5.27	5 54	1.4	1.53
8	6.0	5.40	5.25	5.54	2 4	2.59
9	5.59	5.40	5.24	5.55	3.7	4.6
10	5.58	5.41	5.23	5 55	3.15	5.13
11	5.57	5.41	5 22	5.55	5.22	6.21
12	5 56	5.42	5 22	5.56	6 29	7.30
13	5.54	5.43	5.21	5.56	7.36	8.38
14	5 53	5.43	5.20	5.57	8 42	9.46
15	5.52	5.44	5.19	5.57	9.49	10.15
16	5.51	5.44	5.18	5.58	10.55	11.51
17	5.50	5.45	5.17	5.59	12.0	...
18	5.48	5.45	5.16	5.59	...	a.m. 12.46
19	5.47	5.46	5.14	6.0	a.m. 1.1	1.36
20	5.46	5.46	5.13	6.1	1.58	2 18
21	5.45	5.46	5.12	6.1	2.50	2.56
22	5.44	5.47	5.11	6.2	3.36	3.29
23	5.43	5.47	5.10	6.2	4.17	4.0
24	5.42	5.47	5.9	6.3	4.53	4.30
25	5.41	5.47	5.8	6.4	5.25	4.59
26	5.40	5.48	5.7	6.4	5.57	5.30
27	5.38	5.48	5.7	6.5	6.27	6.2
28	5 37	5.48	5.6	6·6	6.56	6.36
29	5.36	5.49	5.5	6.6	7.27	7.14
30	5 35	5.49	5.4	6.7	8 0	7.56
31			5.4	6.8		8.48

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

4	Sept.	☾	First Quarter	8 44 p.m.
12	„	○	Full Moon	10 53 a.m.
18	„	☽	Last Quarter	1 29 p.m.
26	„	●	New Moon	8 10 a.m.

Perigee 13th September, at 3 42 a.m.
Apogee 28th September, at 9 6 a.m.

At the beginning of this month the Southern Cross will be prone, lying on its right side 30 degrees west of the South Celestial Pole, at about 8 p.m. Mercury will be in superior conjunction with the Sun on the 2nd, that is, on the far side of its orbit, almost behind the Sun. Towards the end of the month it will be well above the horizon after sunset, but not well situated for observation.

On the 4th there will be an occultation of Saturn by the Moon at 2.27 a.m., or nearly three hours after they have set.

On the 10th Venus will be in inferior conjunction with the Sun on the side of its orbit nearest to the earth and only about 25 million miles from it. It will be lost in the rays of the Sun, with its bright side away from the earth, but not in a direct line with it, being about 8 degrees southward.

On the 11th Psi Aquarii will be occulted at Warwick, between about 6.48 p.m. and 7.28 p.m

When the Moon rises on the 12th it will be interesting to notice the nearness of the bright planet Jupiter, somewhat higher and to the left of it.

An occultation of Ki Arietis will take place on the 15th, between 4 a.m. and 4.30 a.m. This occultation will take place somewhat earlier and last longer at Rockhampton.

On the 16th the remarkably close conjunction of Mercury and Mars will be barely observable without binoculars or telescope low down in the east, about an hour before sunrise.

Omega Tauri will be occulted on the 17th, between about 3.25 a.m. and 4.10 a.m., in Southern Queensland

Jupiter will be in opposition to the Sun on the 22nd, and its distance from the earth reduced to about 290 million miles.

On the 23rd the Sun will rise almost directly due east and set due west. An interesting daylight view may be obtained on the 23rd by anyone with keen eyes who can get the Sun shielded off by a building or good dark object, when Venus should be seen not far off to the west and the crescent Moon still further to the north-west. Uranus will be in the constellation Pisces near Jupiter, and Neptune in Leo near Regulus.

4	Oct.	☾	First Quarter	12 1 p.m.
11	„	○	Full Moon	7 14 a.m.
18	„	☽	Last Quarter	12 31 a.m.
26	„	●	New Moon	1 37 a.m.

Perigee 11th October, at 1 24 p.m.
Apogee 25th October, at 11 48 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. 1 OCTOBER, 1927. PART 4.

Event and Comment.

The Dairying Industry—Its Value to the State.

ON the occasion of the opening of the new modern butter factory at Esk, the Minister for Agriculture and Stock, Mr. W. Forgan Smith, who performed the ceremony, reviewed the position of the dairying industry and its value to Queensland. In the course of a notable address he said that the progress of the factory which it was his privilege to open that day typified the advancement of the industry throughout the State, which, in round numbers, was worth over £5,000,000 per annum. The progress that had been made during the last decade was exemplified by a comparison of the production of butter and cheese. In the year 1914 there were 37,230,240 lb. of butter and 7,931,869 lb. of cheese manufactured, whilst the corresponding figures for the year 1925 were 67,731,435 lb. of butter and 13,980,538 lb. of cheese, and for the past year—during which production was affected by drought conditions—50,991,985 lb. of butter and 8,740,355 lb. of cheese. Science had appreciably assisted towards perfecting the process of manufacturing butter, and there existed to-day a widespread knowledge of the process of neutralisation and pasteurisation of cream, which were important practices in the manufacture of butter. It was not sufficient, however, that scientific methods should be adopted solely at the factory. There was to-day a growing necessity that every dairy farmer should have a complete knowledge of animal husbandry and of agriculture, so that he would be able both to care for and feed the animals upon which he relied for his livelihood. In that connection it was interesting to note that the average butter fat yield from dairy herds in Queensland was not more than 120 lb. per capita, whilst in New Zealand it was 230 lb., and in Denmark close to 400 lb. The feeding and breeding of a dairy herd required careful direction, and the conservation of fodder was essential on every dairy farm, together with the utilisation of pedigreed sires which had been raised from families with accredited high production of butter fat.

Assisting the Man on the Land.

IN these directions, continued the Minister, the Government rendered monetary assistance to the man on the land. Advances for the purpose of erecting a silo and for the purchase of the appliances necessary to transfer the fodder into the silo were available from the Agricultural Bank. A subsidy on a fifty-fifty basis on the purchased price of approved bulls up to an amount of £50 was also made available by the Government. Herd testing was also conducted by officers of the Department of Agriculture free of cost to the dairy farmers, and this concession made it difficult to understand why dairy farmers continued to milk herds of dairy cows without seeking to obtain precise knowledge as to which are the profitable and which are the unprofitable units of the herd. Herd-testing results definitely and actually determined this issue, which was one of vital concern to the owner of the herd. High-producing cows, good feed, and efficient methods, made for success in dairying. On the other hand a low-producing dairy herd meant drudgery, privation, and sometimes poverty to the owner. It was a form of national wastage to expend time and energy in keeping a herd of milch cows which were, under all conditions, incapable of returning sufficient butter fat to repay the cost of labour and feed bestowed upon them. Not more than 10 per cent. of the herds in the Esk district had been subjected to the butter fat test, although officers of the Department of Agriculture were ever ready to carry out the work of herd testing without cost to the dairy farmer.

"Queensland's Best is Equal to the World's Best."

"QUEENSLAND'S best is equal to the world's best,'' added Mr. Forgan Smith, and the figures he had quoted in connection with the average butter fat yield indicated that the dairy farmers of this State were placing their reliance on cows which were incapable of producing sufficient butter fat to permit of dairying being as profitable as it should be. Continuing, Mr. Smith said that the quality of the dairy produce in this State had been raised to a very high standard, and to-day it compared favourably with that of any State in the Commonwealth. Queensland manufacturers had secured places of merit in important competitions in which the butter and cheese of other States had been exhibited. Honours at the Islington Dairy Show of Great Britain had been secured by Queensland dairy produce. It was for manufacturers to maintain this high standard of quality, and wherever practicable still further to improve upon it.

Dairying Economics.

THE Departmental Economic Committee, which was instituted by the Minister for Agriculture and Stock (Mr. W. Forgan Smith) for the purpose of investigating thoroughly the business side of farming, is still engaged on a general inquiry into the position of the dairying industry. The complexity of the conditions surrounding the industry has been recognised as well as the need for completeness in inquiry and accuracy in conclusions. It is realised that more than a mere academic investigation is required. Ordinary working conditions in districts regarded as typical Queensland dairy country, and which provide a wide enough variation in climatic and physical features, have been investigated by the committee at first hand, and results, after being carefully tested, will be available shortly for publication. The wide range of the factors governing dairying in the field, factory, and market has necessarily made the work of the committee very arduous, but it has now arrived at the stage when finality along practical lines need not be unduly deferred.

Its work to date has entailed—(1) A complete survey of existing conditions—the importance of the industry, the number of people engaged in it, capital invested, and so forth; (2) The value of herd testing and how it can be put into general practice; (3) Fodder conservation in all its aspects; (4) A study of manufacturing processes and factory efficiency; and (5) Present marketing conditions and the possibility of their appreciable improvement.

In general, the committee has established bases from which conclusions may be drawn and tested thoroughly in practice; and all this will be embodied in a comprehensive report now in course of preparation.

The Fine Discipline of the A.I.F.—A Tribute to Australians.

THE discipline of the Australian Imperial Forces was eloquently defended by General Sir John Monash when addressing the delegates to a recent dental congress in Melbourne. Sir John challenged any one to say that the discipline was not on the highest pinnacle of perfection. In the trenches the Australian soldier was more dependable than any other soldier with whom he had come in contact. Australian individualism was better for the successful conduct of a campaign than the converting of men into machines. In the post-war period of demobilisation the Australian army was the only army of all the Allies in which there was never a suggestion of mutiny or insurrection. Every other army, even some of the crack British regiments, experienced this happening, which was often accompanied by bloodshed. The high level of intelligence of the average Australian, our system of public education, and the sporting proclivities of this country were among the principal reasons which accounted for the excellent discipline in the Australian forces. The great majority of the Diggers regarded the war as a game, which they were determined to win.

Produce the Very Best—The Need of Technical Efficiency.

"THERE is a marked tendency for the acceptance of mediocrity in respect of our products and our production," said Professor E. J. Goddard, D.Sc. (Professor of Biology at the Queensland University), when addressing the students of the Ipswich Technical College recently.

"If Australia is to progress, she will first have to succeed in attracting to her problems of production, primary and secondary, technical and non-technical, the best, or some of the best, individuals of the community. This will only eventuate when conditions are made sufficiently attractive, and, in so far as technical officers are concerned, their value assessed at a higher standard than at present.

"If Australia is to be maintained as a White Australia," continued Professor Goddard, "we have got to recognise that problems of specially Australian nature have to be met, and it is essential that Australia should have available within itself the maximum technical efficiency. Australians are too prone to be satisfied with producing without considering the necessity for producing the very best. This calls for the greater appreciation of technical efficiency, and it is in this connection that the technological institutions are endeavouring to play their part. The availability of occupation in connection with many problems is unfortunately small, or absent, in many cases, inasmuch as the community as a whole has not yet evaluated the necessity for the employment of efficiently equipped technical officers and advisers. How many of our secondary industries employ scientifically trained officers? I refer to industries which, in other parts of the world, do employ such officers as chemists, chemical engineers, &c. In other parts the employment of such men is regarded as essential as advertising, and yet here no need for such men is appreciated. Australia, in so far as her technical achievements in industries are concerned, will not discharge her responsibilities and effect the progress that she might until the necessity for employing good technical officers is appreciated. When the community does recognise the value of such men, and takes action accordingly, then the various institutions, universities, technical colleges, and technological institutes will be able to achieve more than it is possible for them to achieve to-day."

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report from the Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) from 1st August to 27th August, 1927:—

INGHAM.

This district is showing less disease than any other which I have visited so far this year, and this happy state of things has only been attained by carefully supervised seed selection. Both of the Colonial Sugar Refining Company's mills have a staff trained to supervise seed and to watch the spread of the various diseases. They also attend to the pest which is doing most damage in the area—namely, rats.

The result is that the farmers only plant a restricted number of varieties, and they either choose the healthiest block on their own farm, or else buy seed from a healthy farm through the company. This ensures not only that varieties susceptible to disease are eliminated, but also that the plants used are free from disease, as far as possible. The farmers are so used to the company supervising the plant that they are only too willing to have this control, and they all realise the benefit of the system.

Only one badly-gummed field was seen during my visit here, and that is a radical change from the state of affairs in the district a few years ago, when Gum was dangerous in the Macknade area. Since Clark's Seedling has been cut out, the percentage of Gum has decreased, and the field mentioned above was an old ratoon crop composed of Clark's Seedling, Badila, and Korpi, all showing the disease. Owing to the complicated nature of the factors which control the infection with this disease, it would be rash to state that Gumming has been practically eradicated, but it is safe to state that it will not again get out of control as long as the present methods are continued. In addition, the company are trying, by seedling raising and by the importation and trial of varieties, to breed a stock of canes which will show resistance to the disease in case some of the present varieties—e.g., H.Q. 409—should become heavily infected, for this variety is moderately susceptible.

I have mentioned at length the methods employed here, as I wish to point to them as an example that other mills would do well to follow. Many districts lose more than £1,000 per annum through diseases, and it would pay them to employ a field officer who could carry out disease control work under the instructions of the officers of the Bureau. Each district requires the continual supervision of one or more officers in connection with the planting alone, and the field officers of the Bureau would then be able to devote time to the important problems presented by each disease, which is at present impossible, and will remain so until there is a staff far larger than that at present contemplated.

The general position with regard to diseases here is that Leaf Stripe, Mosaic, and Leaf Scald are present here and there to a very limited extent, but wherever they are found to occur, the field is ploughed out after harvesting and thus they are completely under control.

In the case of Gumming the position is slightly different, as this disease seems to react to seasonal variations that are not yet completely explained. Although it would seem that the position was entirely under control, except for a few exceptional cases which are becoming less each year, there is just the possibility that the recent seasons have not been favourable to Gum, though this year is one in which we should expect the disease to occur if it is still active. There is no doubt, however, that the Colonial Sugar Refining Company are working on the right lines, and that it is only a matter of time before Gumming will cease to trouble the Herbert River farmers.

Gum does not seem to be showing in the Toobanna area, even in H.Q. 426, where the trouble has been reported previously, but this fact may lull the farmer on to false security unless he continues his vigilance. Q. 813 seems to be doing well in this area, and as it is resistant to Gum, it will be well to plant it rather extensively, though on the richer soils of the river area it is not recommended.

The new varieties, Korpi, Oramboo, and Nanemo, seem fairly resistant to Gum, though Oramboo has been seen showing Mosaic. They are doing well, and I should recommend their trial in the Bundaberg district for Gum and Mosaic resistance, in limited quantities under supervision.

A great deal of the cane in the Victoria area shows the Leaf Sheath Fungus round the lower end, but as the roots have adhering to them a large amount of soil, it is possible that this is due to the flood.

The flood killed a great deal of cane in the worst affected areas, and much of this has side shot, giving an appearance very similar to Top Rot, so that it is hard to distinguish between Flood Rot and Top Rot. It is possible that this similarity is more than superficial, as red streaks often appear in this flooded cane similar in appearance to those in Top Rot. This was noticed in the Giru area, and has been observed here and in the Freshwater area by Mr. Gibson.

Linear bugs are very prevalent here just now on the leaves of the cane, and though they do not seem to cause any damage, as sucking insects they are worthy of the closest attention, for it is possible that they may be capable of transmitting disease.

Various leaf hoppers are also infesting the cane, and the life histories of these might be interesting from the pathologist's point of view. It seems to me that far too little is known of the vectors of Gum, Leaf Scald, and Fiji disease, and that there is a wide field for investigation.

Owing also to the flood is the fact that in the worst affected areas the farmers are planting badly-flooded cane, which has side shot badly, and the stem of which is in many cases rotted or eaten out by borer. From the point of view of the disease question this is very bad practice, and it would pay to get plants from a healthy region if possible. While this cane may give a strike, it is not healthy, and is very susceptible to disease.

Another important matter requiring attention is the drainage of the farms, especially those affected with Gum. It is well known that the home of this disease is in badly-drained farms, and as in many cases the subsoil is a heavy clay, there is a formation very favourable for the disease. It will pay the farmers to install a system of main drains to take the water from the farms, and to run the water from the paddocks by frequent deep-water furrows. This method of drainage was adopted at Broadwater to combat the Gumming there, and it had an immediate result.

TULLY.

There are three diseases which are affecting the Tully area—Leaf Scald, Top Rot, and Spindle Top, or Sclerotial disease.

Leaf Scald is at present appearing in the chronic stage throughout the area, and a few stools were found in farms on the Lower Tully. One field was seen showing 30 per cent. of Scald, and the consequent loss of crop was serious. True, this is an unusually severe case, but it shows what the disease can be if it is not watched.

There are two phases of this trouble, the acute and the chronic. In the acute phase, the plant dies, and unless it suckers, as it most frequently does, it is very difficult to definitely diagnose the disease.

In the chronic phase, the most notable symptom is the chlorosis or whitening of the leaves of the affected stool, and the growth of side shoots from every eye along the stem. In these shoots, which are also chlorotic, one can often see white pencil lines extending from the base of the leaf to the edge, and often broadening out into a white indefinite streak. At times, too, the pencil lines become red in colour. These lines can often seen seen in the older leaves of the main shoot, while some of these frequently curl inward. This curling is often a symptom which leads to the recognition of the pencil lines. These can also be seen at times in suckers of the acute stage.

The appearance of the disease is periodic, and at times it is very hard to find, even where it is known to be present. Just now it is showing up well at the Tully, but is not easy to see at Innisfail.

Control measures consist of, if possible, getting rid of the most susceptible variety, but in the case where 99 per cent. of the crop is Badila, and this cane is showing moderate susceptibility, there is only one remedy—the eradication (which includes digging out and burning) of infected stools.

For this purpose, and for that of seed selection, I should suggest that the importance of having a trained man continually on the spot be fully recognised. These diseases cause unrealised losses to the farmer every year, and they can be completely controlled by properly supervised seed selection. A man stationed permanently at the mill would be able to give advice to the farmers as to where to get seed cane, and would, by making periodical inspections, be able to give details of the location of and loss caused by the diseases. He would also be able to give information as to where healthy seed could be obtained in the district, and to control all canes brought from other districts.

Top Rot is present in parts, especially in the Lower Tully area, and mainly in flooded cane. We have here again the connection between the weather conditions and Top Rot, for the appearance of the disease was heralded by heavy rains following a dry spell. It does not seem to be causing extensive damage, and gives no cause for alarm.

Spindle Top is a disease which is caused by a Sclerotial fungus, hence its other name of Sclerotial disease. This fungus forms on the trash, which it binds together near the top of the stick, and thus chokes the spindle, which later dies and rots, giving an appearance very similar to Top Rot. The cane, however, does not side shoot, and the top is not easy to pull out as is the case with Top Rot. Moreover, to the experienced eye there is an appearance about the dead leaves which is hard to describe, but distinguishes between the two diseases. The bound leaf sheaths have a pink coloration, and usually the leaves have a reddish blush extending about 3 in. from the heart. The disease is disseminated in two ways.

(1) It is carried on trash, and so it is a good thing to burn the trash in badly-infected fields. When taking plants from infected fields, which should be avoided as far as possible, do not leave any trash on the sets if it can be avoided.

(2) It is carried on the sets in some cases, as the fruits of the fungus can and often do, adhere to the cane. In the Tully area care should be taken to get clean seed, for the disease is by no means universal, and this applies especially to the planting of new blocks. Here again we see the necessity of a pathologist to carry on selection work.

With regard to Leaf Scald it is well to note that knives, implements, and even clothes can carry the disease, and the knives should be disinfected after cutting a diseased field.

Another important matter in connection with the Tully area is the introduction of varieties. At present about 99 per cent. of the crop is Badila, but as the land is cropped, much of it will fail to continue growing good Badila cane. Other varieties will have to take its place on the poorer patches, and the selection of these should be made with care, and by an expert. Korpi, H.Q. 426, and some other varieties are already in the district, and an endeavour should be made to keep the number of importations as low as possible. The farmers' league should arrange that these should be made through this Bureau to insure clean seed, and there should be a list of approved varieties, with all others, penalised. One or two farms should be selected for the trial of new canes, in trials planted and controlled by the Bureau or by the mill officer when one is appointed.

Apart from the disease question there is the matter of rats which are causing great damage to crops. Systematic poisoning should be undertaken, and in this the field mill officer seems also a necessity for the near future.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report on El Arish district which was visited during August, 1927, *by the Assistant Pathologist, Mr. E. J. F. Wood, B.Sc.*

EL ARISH.

In the El Arish area, including Jaffa and Maadi, there occur the same diseases as in Tully.

Leaf scald is present in all parts of the area, to a greater or less extent, but is only causing appreciable damage on a few farms. Nevertheless, it is likely to become serious, and the selection of plants should be closely watched. It will be well to make the cutters sterilise their knives by dipping them for five minutes into boiling water before they start cutting on each farm. There is an increasing percentage of Clark's Seedling (H.Q. 426) in the area, and it is showing more Leaf Scald than I should like to see. It will be advisable to watch closely the planting of this variety, and even to give it up where the disease is present to any extent, for this variety is very susceptible. As the disease usually shows up in this cane in the acute stage, where the symptoms are hard to find, I should advise farmers to leave fields which are showing any dead canes when they are seeking plants. It would also be well to try out Q. 813 in order if possible to replace Clark's Seedling, as it is probable that it will prove fairly resistant to the disease.

Top Rot was not definitely diagnosed on any of the farms visited in this area, but Spindle Top was seen on most fields. In this disease, the selection of plants, discarding those sticks of Badila which show a reddish instead of a black stem will repay the farmer.

The biggest curse of the sugar industry, so far as diseases and varietal deterioration are concerned, is contract planting. In this system, a gang of men, usually ignorant of the diseases, and often of the varieties of cane, are set to cut plants. Of course they cut anything and everything, with the result that no diseased, borer-infected, or weak canes are rejected, and the plants are really not fit to be put in. It is a feature of most of our diseases that they do not kill the stool outright, so a diseased plant will grow up from a diseased set, and thus infection spreads. If this system is to continue, it will pay the farmer to go through the plant block before it is cut, and to trash it and cut out with a cane knife any stools or canes which are not healthy and are unfit for plants. This will go far to minimise the evil, but a continuous inspection of the plants as they are cut is also needed to reject any sets attacked by borer or root diseases. This haphazard method of planting is the reason why it is so difficult to control diseases. If there is any part of the cane work that the farmer should personally carry out it is the plant selection and the planting, for upon these, to a far greater extent than on any subsequent work, the resulting crop depends. And this is the work to which, as a rule, he pays least attention. You will never see a stock breeder put his newest jackeroo to select the parents for his stock, yet it is a precisely similar thing that the farmer does every day. This does not only apply to the district under discussion, but to all the districts that I have visited this year.

I should recommend that variety trials be carried out in the El Arish area, in order that some definite information may be gained as to new varieties. The usual method employed by the farmers is not conclusive, and the trials should be planted and supervised by men of the Bureau who know something of the characteristics of the canes in question.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available for publication the following report for the period August-September, 1927, from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

The Mound-building Ant (*Aphaenogaster longiceps* Sm.).

The presence of a small mound-building ant on a few cane farms in the Bundaberg district has recently come under the writer's notice. The pest was first seen when inspecting a field of cane at Oakwood, which was known to be suffering damage from the cane grub *L. frenchi.* For the main part these ants are confined to a narrow piece of red sandy forest land, which does not differ to any extent from that surrounding it, and according to the present owner they have nested in the same strip of country for several years without any apparent increase. The general causes contributory to the final damage due to these insects will be discussed later, but in all, it consists of a severe stunting of the cane stools, and at first sight is suggestive of a mild cane grub infestation, but the affected stools do not show the yellowing of the outer leaves which is so typical of grub damage. Thus on a cursory glance the area held by the ants was thought to be an extension of the grub attack, but closer examination revealed the presence of several mounds scattered promiscuously throughout the rows of cane, and each mound contained one or more entrances leading to numerous underground galleries. Mr. Dormer reported the occurrence of an ant with similar habits from Tully (see "Queensland Agricultural Journal," January, 1926, page 46), but it is not known whether these two species are identical. A variety of the same ant was seen on my last visit to the Mackay district, and was plentiful amongst blady grass (*Imperata arundinacea*) at Sarina, but it was not found encroaching on the adjacent cane fields. This species cannot be classed as a serious cane pest, and, moreover, it is unlikely that it will spread to any great extent outside the small strips of country it now inhabits. Specimens have been sent to the National Museum, Melbourne, and have been kindly identified by Mr. J. Clark as *Aphaenogaster longiceps*, Sm., being of a pale-yellow colour and about one-fifth of an inch in length. They are of a retiring nature, and though occasionally observed skulking about the entrance of the mound or scouting further afield, none have been observed in the act of feeding. When disturbed in their nests, they display no signs of hostility, but are more disposed to seek places of safety. They are active throughout the whole of the year, and a few days after rain they can frequently be seen bringing up particles of earth, the result of their tunnelling operations, and dropping them over the sides of the mounds. Where mounds occur near cane stools, the earth underneath these stools is quite honeycombed by their galleries, and cane roots penetrating this maze of tunnels have sometimes been found pitted. Mr. Clark does not think that the ants will eat the roots, but is more inclined to the view that they will break off the tiny root hairs which come in their way.

Found associated with these ants are species of subterranean aphides and hoppers, which live on the sap of the plant, which they extract from the roots by means of their suctorial mouth parts. These, no doubt, the ants attend, and in return for this attention their subterranean associates yield them globules of honey dew. The hoppers belong to the families Delphacidæ and Jassidæ, but so far the aphid remains unidentified, it most probably being a hitherto unrecorded indigenous species, and it will be dealt with more fully in a subsequent report.

This commensalism recalls the intimate association which exists in a somewhat parallel case—namely, that of the American cornfield ant *Lasius niger americanus* which cares for the eggs of the corn root aphis *Anuraphis maidiradicis* in its nest during the winter, transfers the aphids or stem mothers as they are then called, as soon as they hatch out, to the roots of weeds. Later in the spring when corn plants are available, the following generations are transferred to the corn roots.

Returning to our ant *A. longiceps* after this digression, it will be seen that the damage wrought by these pests is indirect as well as direct, and may be discussed under the three following headings:—

(1) Mechanical damage done to cane roots by pitting and breaking off root-hairs, thus curtailing the plant food supply.

(2) Physical effect produced by the galleries which the ants construct, tending to dry out the soil surrounding the rootlets quicker than the soil not so honeycombed. Thus the plant experiences drier conditions than it otherwise would if the usual action of capillarity were allowed to go on unhindered.

(3) Their attendance on sap-sucking insects, which drive nourishment from the cane roots, and thereby have a weakening effect on the plant, makes them indirectly responsible for this damage.

Control Measures.

Various sugary poison baits containing arsenicals, such as have proved effective in killing other species of ants, have been used against this ant, but without any apparent success. However, since the feeding habits of *A. longiceps* are as yet unknown, any attempts in the use of poison baits must still be regarded as merely speculative.

Paradichlorobenzene was tried, and although it will probably be of greater service in the summer months, it was found during this last winter that if placed deep in the ground the fumigant would not evaporate, and if placed near the surface, diffusion of the vapours was so great on account of the strong westerly winds which prevail here throughout the winter, that the toxic properties of this chemical were to a large extent negatived, and it proved of little discomfort to the ants which carried on their mound-building activities as usual.

Carbon bisulphide injected into the soil where their mounds occur has given the most promising results. This fumigant was injected at the rate of 1 drachm 55 minims twice on both sides of the cane stool. This represents the maximum dose injected into the soil with one stroke of the plunger of a Dank's injector. When using this implement it would be preferable that the footrest be placed in its highest position to allow the spear to penetrate to its greatest possible depth. Then with this adjustment made, it would be possible to sink the spear to a depth of 2 to 3 inches, inject, and again sink the spear until it has penetrated the soil to its limit, at which depth another injection is made. This will ensure the fumes penetrating to the lowest levels of the nest and will kill developing larvæ as well as adult insects.

Sometimes in large colonies part of the nest escaped fumigation, and after the lapse of three or four days the ants showed signs of activity by bringing out their dead and dumping them at some distance from the entrance. In such cases it would be profitable to fumigate once more, and if this treatment is persisted with whenever fresh mounts appear, this troublesome species would soon be exterminated.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from Mr. E. Jarvis, the Entomologist at Meringa, the following report (August to September, 1927), detailing results of observations in connection with study of the pupal stage of the greyback cane beetle, "Lepidoderma albohirtum, Waterh.," pupæ of which may be ploughed up in this district during the months of September and October:—

NOTES ON THE PUPA OF OUR GREYBACK COCKCHAFER.

Up to the present this life-cycle stage of our primary cane pest has been somewhat neglected, although the pupa has been figured and alluded to more than once in our various publications (see "Queensland Agricultural Journal," xvi., pp. 47-49, 1921).

As pointed out previously, it occupies a position of complete isolation in the soil, lying not only at a greater depth than the eggs of this species, but being placed in a specially prepared subterranean chamber, the smooth puddled walls of which are well calculated to effectually exclude small insect enemies and prevent it from getting too dry or being harmed by heavy rains.

Unlike the grub and beetle condition of this cane pest, there seems to be but one artificial method of combating its pupa—viz., by fumigating the soil of affected canefields during September and October after the cane has been taken off.

The probability of our being able to obtain success by this control method has been based firstly, on the knowledge that grubs of *albohirtum* usually construct their pupal chambers directly beneath the line of damaged stools; secondly, that the walls of this chamber, although more consolidated than the surrounding soil, are permeable by gases; and thirdly, that the breathing spiracles possessed by the pupæ in question render them very susceptible to the influence of poisonous fumes.

The Structure and Function of Spiracles.

The stigmata or spiracles, through which the outside air is able to freely pass into specialised tracheæ—situated segmentally in the bodies of both grub and pupa forms of our greyback cane beetles—are deserving of attention; since, quite apart from their curious structure, these slit-like openings probably aid us to secure high percentages of mortality when fumigating grub-infested soils with poison gases.

Looking at a larva of this species we shall notice on each side a row of nine spiracles, which are dark-brown in colour, circular, and slightly concave; the concentric middle portion, however, being pale-yellow and very convex. (Fig. 4 on plate.)

How the Pupa Breathes.

The stigmata of the pupa of *albohirtum* (greyback cockchafer) differ greatly from those found on the grub, such dissimilarity of form having probably resulted from adaptations designed to meet a changed condition of life. Whilst lying quietly in its subterranean chamber the spiracles on the sides of the pupa are in little danger of becoming clogged with dust or tiny particles of earth, so that instead of being closed externally like those of the grub (which tunnels constantly through the soil) the stigmata of the pupa possess no outer shield-like covering, the tubular mouths of the six large spiracles (three of which are shown at A., Fig. 1) being open to the outside air. Eighteen occur on each pupa, but, unlike those on the grub of *albohirtum*, comprise three distinct and interesting forms (see Figs. 1, 2).

Possibly the most important of these sets of stigmata from an economic standpoint are the six largest, already referred to, found on the sides of the first, second, and third abdominal segments. (Fig. 1 A.) These measure about 0.7 mm. in diameter, and when viewed with a pocket lens appear as short tubes about 1.00 mm. in length, which, if looked into, are clearly seen to be kept open by a series of chitenous rings (Fig. 3). Each of these spiracles is, in reality, an open mouth communicating with the respiratory system of the pupa, consisting of numerous air tubes known as tracheæ. Following this row towards the tail-end we shall notice four smaller stigmata, on each side of segments (Nos. 4 to 7—Fig. 1 B.). The first two of these consist merely of a V-like depression, while the spiracles on segments 6 and 7 are a little larger and more regularly concave. Radiating from the centre of all four will be seen six dark-brown lines.

Lastly, we must notice the strange-looking spiracles occurring on the lower surface of the abdomen of this pupa, situated centro-ventrally (Fig. 2), which happen to be quite different in structure from any of the others. While the first anterior one is practically circular, the remaining three are transversely elongate and sub-ovate; all four, however, projecting slightly from the surface of the abdomen. Unlike those placed on the sides of the pupa, the lip-like edges of the mouths and the interior portions of these ventral stigmata are densely fringed with fine hairs which form a felt-like covering and radiate towards the circumference

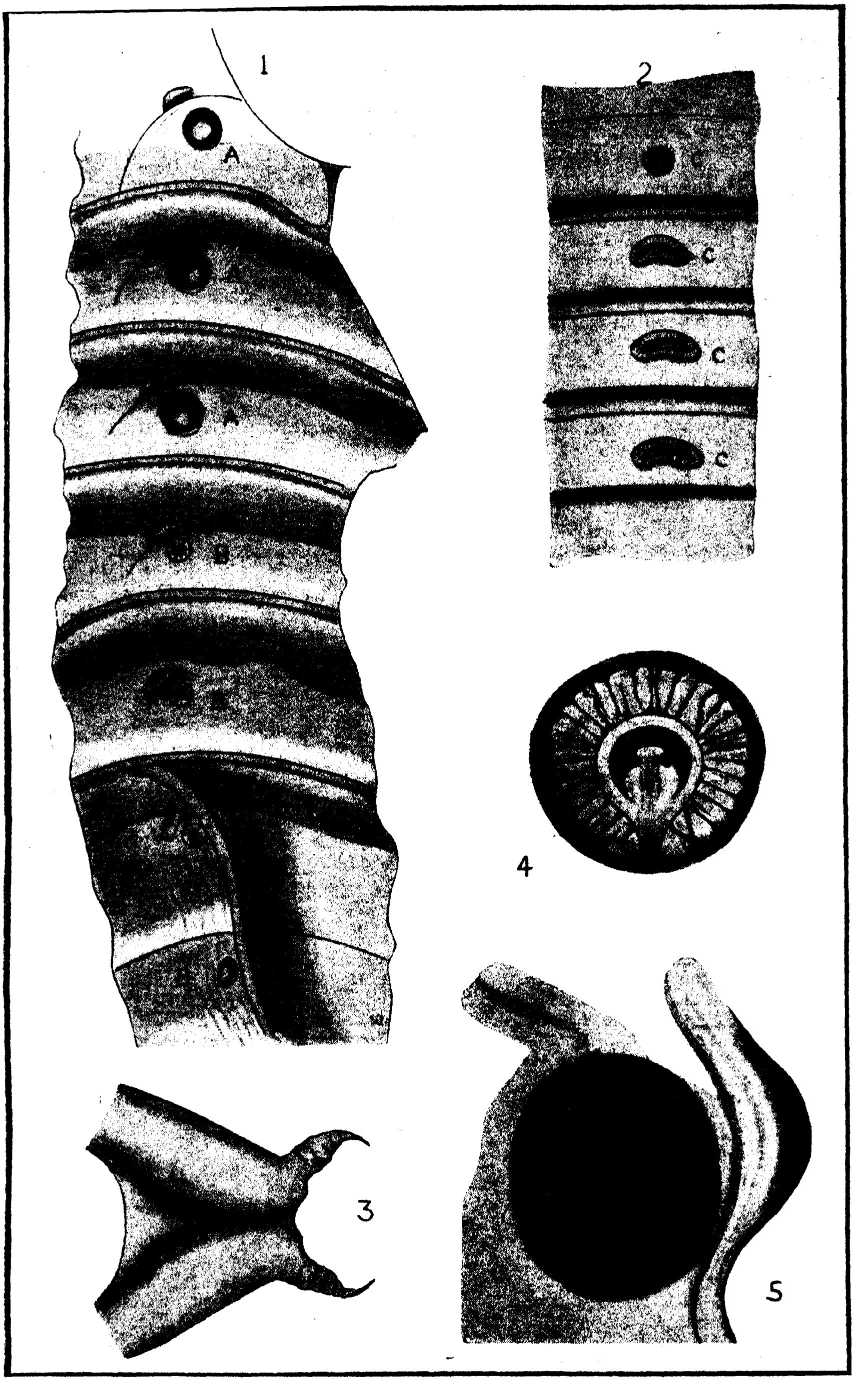


PLATE 94.

Fig. 1.—Diagrammatic sketch of portion of size of Pupa, showing form and position of spiracles; (× 6.) A.A.A., large tubular form; B.B.B.B., smaller form.

Fig. 2.—Sketch of centro-ventral portion of abdomen, showing form and position of spiracles, C.C.C.C.; (× 10.)

Fig. 3.—Cremaster of pupa, showing horns at tail end; (× 5.)

Fig. 4.—Diagrammatic view of spiracle of grub; (× 30.)

Fig. 5.—Diagrammatic sketch of spiracle of pupa shown at Fig. 1. A.; (× 28.)

All illustrations original.

of each spiracle from a central point marking the tracheal opening. These hairs are designed to prevent entrance of minute soil particles, from which we may infer that during some phase of pupal development this particular portion of its exoskeleton comes into contact with, or is rubbed against, the floor or sides of its underground chamber.

Various complex movements doubtless take place in the profound darkness of its cell while the beetle is gradually freeing its legs and body from their chitenous covering, an operation which is performed a few weeks prior to emergence of beetles from the ground, and is probably attended with more difficulties than those experienced by a moth or butterfly when escaping from its chrysalis. In the case of our greyback, the two sharply-pointed spurs or the cremaster of the pupa (Fig. 3) would serve a useful purpose in this connection, as when forced into the compacted earthen wall of the pupal chamber in such manner as to anchor the end of the abdomen, the imprisoned beetle would have a chance by complicated twistings, &c., of the upper portion of its body to loosen, crack, and ultimately free itself from the enveloping pupal shell.

Notes on Depth of Pupal Chambers.

Some years ago (1915) the writer conducted tests during the month of October in order to ascertain the position of pupæ occurring in volcanic soil at Meringa. These were made by digging a number of pits 5 ft. square by 2 ft. deep. The first four of these holes contained collectively, a beetle (*albohirtum*), four larvæ, and twenty-three pupæ; besides thirty-two grubs of other species of Scarabæidæ (principally *Lepidiota frenchi* Blkb.) in various stages of growth. No pupal chambers occurred nearer than 1 ft. from the surface, and none deeper than about 15 in.; the majority being in soil that was nearly dry.

Pupæ have also been found by us at depths of 4 to 6 in. in sandy or sandy loam soils. Such great variation in depth (from 4 to 15 in.) must, I think, be attributed to the combined influence of temperature, moisture, drainage, and mechanical condition of infested lands, acting in conjunction with other agencies affecting the movements of the mature grub; possibly, at times, too, the aggression of certain predaceous soil-frequenting insect enemies chancing to be present in the soil when grubs happen to be tunnelling below to pupate.

Additional notes relating to this interesting life-cycle stage of our "greyback" will be supplied next month, which will deal with the question of fumigation of the pupæ of this pest, together with details as to the method of applying the fumigant, and its cost per acre.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Moth Borer causing "Dead Hearts."

Growers are advised to be on the look-out amongst young plant and ratoon shoots for evidence of the presence of the "Large Noctuid Moth Borer" (*Phragmatiphila truncata* Walker), the caterpillars of which are at present effecting damage in certain localities around Gordonvale. This insect is common also in the Burdekin district at times, where it is reported to destroy young cane plants by tunnelling in the central core, which is followed by death of the heart-leaves. Any diseased shoots or dead-hearts noticed should be cut out at a point about a couple of inches below ground level, and either crushed or burnt to kill the caterpillars or pupæ of this moth.

If this work were done at the commencement of the season, most of the moths responsible for the second and much larger brood of caterpillars would be destroyed. In cases of severe infestation the braconid parasites of this moth should be allowed to escape from diseased shoots (see "Australian Sugar Journal," vol. xvi., p. 247, 1924).

Methods of Fighting the Beetle Borer.

1. Liberate colonies of Tachinid flies (*Ceromasia sphenophori*) among affected stools. To enable these parasites to breed, about half an acre of borer-infested cane should be allowed to remain uncut for about six months after such liberation. *Note.*—Consignments of Tachinid flies will be supplied free of charge by the Sugar Bureau, upon application to the Entomologist in Charge of Meringa Experiment Station.

2. On areas where Tachinids have not been liberated it is advisable to burn the trash before cutting, by which means thousands of these weevil borers harbouring under old leaf-sheaths, as well as numerous grubs tunnelling in the canes, will be killed.

3. Cut twenty or more pieces of cane, eighteen inches long, split them in half lengthwise, and place same on headlands in a heap, which must be covered

over with sufficient trash or debris to prevent the cut surfaces from drying too rapidly. Visit these traps every second day to collect the weevil borers attracted to same.

4. Strip the trash, in order to establish conditions repellant to these beetles by destroying their hiding places, and admitting more light and air amongst the cane sticks.

5. Plant clean seed, free from indications of borer tunnels.

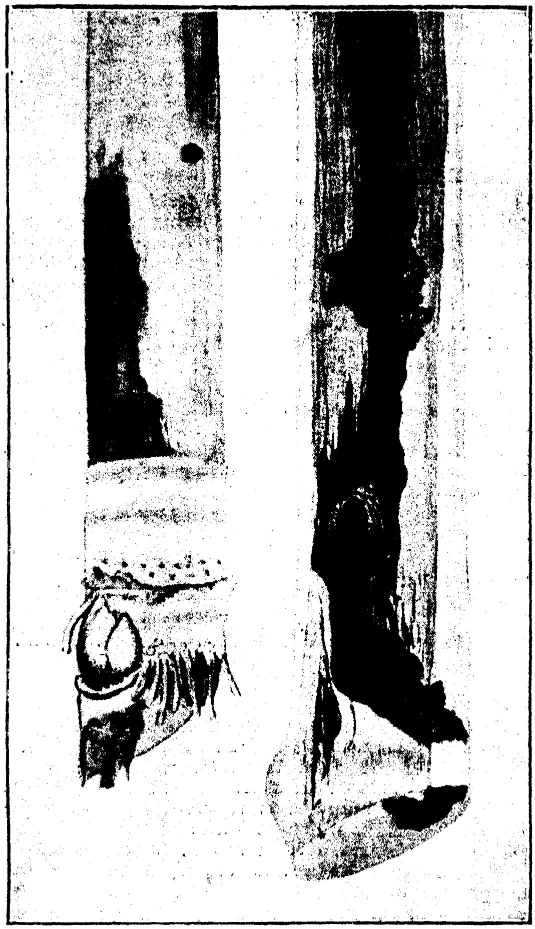


PLATE 95—INTERNAL AND EXTERNAL DAMAGE TO YOUNG CANE SHOOT CAUSED BY A CATERPILLAR OF THE "LARGE MOTH BORER" (*Phr. gmatiphila truncata*, Walk.). NATURAL SIZE.

How to Obtain Valuable Hints.

The best way of obtaining entomological advice calculated to meet the needs of individual growers is to visit Meringa Laboratory when possible and have a chat with the entomologist.

One gets little in these days without making an effort of some kind; so if too far removed for personal interview a letter is the next best thing, and will always receive prompt attention.

Literature in the form of illustrated bulletins dealing with the numerous varieties of canes introduced into Queensland, the cultivation and manuring of sugar-cane, and methods of combating the various insect pests of same, can always be obtained by applying to the Director of the Sugar Bureau, Department of Agriculture, Brisbane, and should be in the hands of all intelligent growers.

Good enough to Practice on!

HOW often has one heard this remark with reference to an old and worn out piano? If only a little careful thought were given to the subject, it would soon become obvious that a Kiddie cannot possibly be expected to make progress if hindered by a poor piano.

What's the use of helping with one hand by engaging a good teacher and hindering with the other by forcing the youngster to practice on an instrument that will perhaps ruin sense of tone and touch.

Remember a good piano encourages—a poor one discourages!

PALINGS'

have a large and representative range of high-grade pianos, from the Belling at its remarkably low price to the illustrious Bechstein. There is an instrument for every purpose and purse.

The deposits are as low as £8, and four years' terms, with easy monthly payments, are available. Call and inspect the Pianos and get full particulars of the prices, etc., or write for free catalogue and price list.

Palings

Established 1853.

BRISBANE
TOOWOOMBA
ROCKHAMPTON
TOWNSVILLE

COW PEAS. As a green fertilizer these cannot be beaten. I have stocks of prime Blacks, and price is right.

SEED MAIZE. I have a nice selection of 90-day and other varieties.

Write—

W. A. FORTH, ***Agricultural Seedsman***
Upper Roma Street, Brisbane
Reliable——Responsible——Punctual

A STANDARD IN CONCENTRATED PLANT FOOD

A.C.F. FERTILISERS

FOR ALL CROPS

A.C.F. Fertilisers set a standard in concentrated plant food. Feed them to your crops and watch the result! An inquiry costs nothing—write now for information and prices.

AUSTRALIAN CO-OP. FERTILISERS LTD.,
LITTLE ROMA STREET, BRISBANE.

Insure with the

Royal Insurance Coy., Ltd.

FUNDS EXCEED £35,790,927.

FIRE DEPARTMENT.

Fire Risks of all kinds accepted. Loss or damage by Lightning, Gas Explosion, and Bush Fires included. Loss of Profits also accepted.

ACCIDENT DEPARTMENT.

Personal Accident and Sickness, Public Risk, Plate Glass, Burglary and Fidelity Guarantee Insurances accepted at lowest current rates.

Be wise to-day and take out a Royal "Paragon" Accident and Sickness Policy (covering 32 sicknesses).

MARINE COVERS GRANTED.

Queensland Branch
Royal Insurance Buildings,
355-357 Queen St., Brisbane.
GEO. L. EVES, Manager for Queensland.

If Disinfectant has to be used, USE THE BEST—a few good ones to select from

CN DISINFECTANT very strong, 25% Cresols.
Sidolia contains 10% Cresols.
Bestyette contains 12% and 2% Cresols.
Cidol for the Cockroaches.
Solution "D" for the Bed Bugs and their eggs.

We are sole agents for the above and will be delighted to supply you with any further information. Just write us. All above guaranteed by us

NORRIS AGENCIES LTD., 639 Ann St., Valley

FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report from the Northern Field Assistant (Mr. A. P. Gibson):—

HERBERT.

The North Queensland winter has been truly delightful. The rainfall for the month was scanty; there had been more than enough prior to this, therefore the dried conditions were of a distinct advantage in promoting all seasonal work. August rainfall 10 points; for the year 90.66 inches.

The Ingham district was discovered in 1870. Sugar-cane culture commenced soon afterwards. The first sugar was manufactured at the Gairloch Mill, 1872. The varieties raised at the beginning were Bourbon and Black Java; these were badly rusted in 1876 and were supplanted by other less susceptible varieties. In 1890 a wave of prosperity commenced and has continued since. Some small mills were erected, but did not carry on for long. The factories that prospered were the Macknade, established by Messrs. Neames Bros. 1874 (afterwards purchased by the C.S.R. Co.), and Victoria, put up by the same company about seven years later. For the last three years the two local mills have crushed 1,115,662 tons of cane for 146,974 tons sugar, valued at some £3,367,030. For the week ending 20th August, Macknade milled 7,362 tons cane—its greatest tonnage for the same number of hours worked. Victoria in the same week lost a day and a-half's crushing owing to a break.

The Crop.—Cane is a hardy plant, it is wonderful how it recovered since the early floods. Immediately after the cyclone early in the year, the district crop was a very speculative one, but since it has improved with amazing speed. The prevailing sunshine is having a beneficial influence on its growth and quality, also permitting of its being removed with rapidity. At the moment it is considered to be far better than the previous crop, and is now estimated to yield 350,000 tons—25,000 better than last year. The H.Q. 409 part of the crop (about 30 per cent.) had recovered astonishingly well and is now heavy in flower—this generally marks the end of the growing period. The time for which cane can be left standing after arrowing is, of course, dependent on variety and season. Most of the Badila land was deeply inundated and the crop growing thereon seriously damaged or killed, and such destruction must naturally reduce the seasonal percentage of this kind.

Crushing operations commenced early in June. The work at the two local mills is proceeding smoothly and well. Practically no cane has been burnt so far. The enormous quantity of silt covering the harvested cane is hampering mill work, also causing more machinery wear than usual. Some 13,000 tons of cane is being crushed weekly, and the two mills must continue to go their hardest to complete the apparent ever-growing cane tonnage by the year end. About 7½ tons of cane is required to make a ton of sugar. Rapidity in removing the harvested crop from field to mill is of vital importance and is quite realised in this region. It is pleasing to note the clean condition of cane coming forward for treatment. The company endeavours to obtain 97 per cent. millable cane, but this high standard has been hard to procure because of the heavy stem shoots and most obstinate nature of ground leaf sheaths.

Planting.—Good and healthy crops cannot be expected in ill-drained, sour, poorly-tilled soils. The physical condition of some fields being planted is bad; this could have been improved by another ploughing. This part of the business is of paramount importance; equally important is the need of good seed. Seriously damaged cane was being planted in parts. This is the kind that has the great tendency of bringing about variety degeneration, and such seed is usually placed thickly—a wise precaution. More lime, more green manuring, and a superior draining system would improve subsequent crops. The area planted to cane for 1928 is greater than usual, and generally it has germinated favourably and is progressing well. Heavy rain falling immediately after planting has hardened some surface soils and hampered germination, but at the present moment the prospects for 1928 are most promising.

Varieties.—The following canes seem eminently suitable for this area:—Badila (always where it will grow), Oramboo, Korpi, Nanemo, H.Q. 409 on the wetter lands, and Q. 813 preferably for late planting.

Diseases.—At present the area is freer from diseases than the more northly ones; such a pleasing state of affairs, it may be said, is the result of judicious plant control. Less than three years back the gumming disease was very prevalent, now it is rather hard to find. This fact alone gives some idea of what can be done by skilful selection and the constant discarding of susceptible canes or anything not quite up to type. At Halifax, however, a badly gummed field of mixed ratoon canes was seen. The varieties affected were Badila, Korpi, and H.Q. 426, the latter susceptible variety more than likely was responsible for the infection.

Pests.—Rats, army worms, wire worms, black crickets, weevil, and big moth borer destruction was more or less noted. Poison baits are being spread at present to help control rats.

A farmer has been busy for many months removing flood-washed sand covering his valuable soil. Some 30 feet of sand covered a very promising crop of Badila on another farm inspected. Cane had been planted in sand, it had germinated favourably, but appeared sickly and, I think, must perish when the plant food becomes exhausted in the mother plant.

Macknade 1927 *Seedlings.*—Some 2,500 seedlings have been raised and were looking well.

TULLY.

Fourteen points of rain fell during the month, and the year's total now stands at 156.58 inches. The prevailing lengthy stretch of rainless weather had improved the crop quality, also permitting the advancement of all out-of-door work. Lack of soil moisture is beginning to have an ill-effect on the 1928 crop growth.

The Crop.—Badila, the king of its kind under the northern sun, is almost wholly grown. The crop in general had made much cane; it had grown and arrowed but little since my last inspection. Some heavy crops have been cut, 65 tons per acre seems to have been the greatest amount harvested. Superior crops and a higher c.c.s. may have been realised had some of the more matured ratoons been harvested earlier in the season in preference to the plant. It is pleasing to note that most fields are cutting out above early estimates.

Harvesting and grinding have proceeded smoothly to the present. Favourable weather has permitted the harvesters maintaining an adequate supply of cane; 25 per cent. of the mill supply is burned by permission before harvesting. 95,000 tons of cane had been milled to the 3rd September, and 90,000 tons or more yet remain to be crushed. The average mill c.c.s. has reached 13.5 per cent. and continues to rise gradually. Most of the cane coming in for milling could be much cleaner. Where farmers own the portable rails and have engaged three-men gangs to harvest the crops, the cane is very clean and a credit to them.

Varities.—Badila (N.G. 15) should be grown, as long as it will grow well, other sorts in the near future will probably be required to take the place of Badila on the less fertile lands, of which there is plenty; therefore it may not be out of place here to mention some canes suitable for such soils—Oramboo, Korpi, Nanemo, or H.Q. 409, and Q. 813 for late planting on the more cohesive soils. H.Q. 426 although a good sugar producer and doing well, cannot be recommended because of its great susceptibility to most diseases. 7R. 428 (Pompey) is not favoured, mainly because of its very poor quality. A crop of this kind raised on a Lower Tully River farm yielded 38 tons per acre, having an average c.c.s. of 10.5 per cent.

Pests.—Tully area with its many winding grassy creek banks is the home of the rat; the destruction from this pest is great in parts. Farmers are again urged to co-operate and try to keep this most destructive pest under control by systematic poisoning. Scrub turkeys are severely damaging the matured crops adjacent to the standing scrubs. Army worms are badly eating the leaves of ratoons. Weevil borer is not plentiful; it is, however, only a matter of time when this pest must become established in the area, being transported in the harvested cane from adjacent infested areas, also by the introduction of infected plants.

Diseases.—Leaf Scald: The area may be freed of this by more skilful selection of plants. Spindle or Needle Top is caused by a fungus which binds tightly the top leaf sheath to stem, thus causing a spindle-like top. This complaint is responsible for big annual Badila crop losses. The writer has observed this to be greatest where the growth of cane has been checked by grubs, stool crowding or smothering, too wet or too dry a soil condition. It is not recommended to plant these apparent weaker canes, for they must bring about plant degeneration and likewise carry infection to clean fields. Trashing probably would reduce the annual losses in sugar and weight. Insufficient care is exercised after trash burning in the loggy areas, and it is quite common to see fiercely burning stumps or logs within a few feet of the trash or standing cane. The vegetation is distinctly dry and if greater precaution is not taken, disastrous fires must follow.

EL ARISH.

This area is estimated to yield some 34,000 tons of cane, and about half of this total has been cut.

It is gratifying to note that the older planted fields are being cleaned up in readiness for the plough; explosives and fire are great helpers in reducing this laborious and costly work.

The Central Field Officer, Mr. E. H. Osborn, reports for month ending 12th September:—

MACKAY.

Farleigh.

This area takes in some extremely broken country, for steep ridges carrying stones and boulders of all sizes are very common. Most of these ridges, however, carry good soil enabling good ratoons to grow, otherwise the difficulties of transportation to the tramway system would make the cost of production too great. Cane was grown on most of these ridges by coloured labour many years ago, and subsequently went out of cultivation. When replanted in later years thick, dense lantana had first to be removed, and the good quality of the present crops speak well for the value of lantana as a fertilizing agent. The mill was running smoothly with the staff showing a fine example of the value of co-operation.

The original estimate of 123,000 tons was expected to be realised and, with the exception of the cane from the newer lands upon the North Coast Railway, the density was very fair. Clark's Seedling was especially so, several 16.0 c.c.s. being recorded. Q. 813 was well up to its usual high standard with an average of 15.5 c.c.s. M. 1900 was also steadily improving, and so far seemed fairly free from Red Rot.

Cultivation.—With such a proportion of rough country, cultivation methods are not as good as they should be, very shallow ploughings being noticed on several farms, due no doubt to the hilly nature of the ground. Many of the Maltese farming in this particular part of the mill area do not worry about straight drills or drainage problems. Upon several badly-drained farms bedding up into small plots would improve the growing conditions immensely.

Fertilizing.—Very little is done upon the hillside farms near Costello, Habana, or the rougher portions of Richmond or Hill End. About the "Leap," Coningsby, and Foulden, however, a fair percentage of complete fertilizers are used and certainly seem to be giving satisfaction.

Green crops would be more popular, but dry spells and insect attacks often affect their germination. Many local growers formerly broadcast corn to plough in, but have now ceased owing to dangers from Mosaic.

Liming on the heavy low-lying soils is also practised, and the texture seems much improved thereby.

Cane Varieties.—Q. 813, H.Q. 426, M. 1900, N.G. 15, D. 1135, Malagache, Cheribon, Innis, E.K. 28, Q. 1092, and Uba are all grown hereabouts, the first-named four being the most popular; with Q. 813 easily in the lead. As mentioned earlier in this report, these canes are again proving their suitability in the local soils. N.G. 15 on the newer lands is also very good. E.K. 28 had just started to come into the mill, and was very fair in c.c.s. value. Q. 1092 as a cropper seemed good, but it arrows too freely and the density was only medium. Innis is still being grown, but owing to its partiality to Red Rot and Mosaic is likely to go out at any time. Uba is probably grown here in larger quantities than elsewhere in the Mackay area, but is not to be recommended and is gradually going out of cultivation. Q. 855 is only grown in odd places, but one Richmond grower claims very fair returns from it.

Diseases.—Mosaic and Red Rot were the principal diseases noticed:—

COSTELLO.

Mosaic—	B. 147	2 farms
	Innis	4 farms (heavy)
	Cheribon	1 farm
	H.Q. 426	2 farms (heavy)
	N.G. 15	2 farms
	M. 1900	2 farms

HABANA.

Mosaic	H.Q. 426	3 farms (heavy)
	Innis	4 farms (heavy)
Red Rot	H.Q. 426	2 farms
	Innis	2 farms

HILL END.

Red Rot	M. 1900	1 farm
Leaf Stripe	Green Cane	1 farm

RICHMOND.

Mosaic	H.Q. 426	1 farm
	D. 1135	1 farm
	N.G. 15	1 farm
	Innis	1 farm (very heavy)

THE LEAP.

Red Rot	Innis	1 farm
Mosaic	Innis	1 farm
	Cheribon	1 farm
	D. 1135	1 farm

About Foulden four farms were visited, but no disease of any sort was noted; also the proportion of Q. 813 on them was probably greater than on many others.

The above figures show the large hold that Mosaic and Red Rot have on Innis, and growers should replace this variety with a cleaner variety. Growers had the diseased canes pointed out to them, and general control measures were outlined.

Proserpine.

Early in September and although dry this locality looked very well. Crops were cutting well up to estimates and the sugar contents very good. Some 55,000 tons had been crushed out of an estimate of 117,000, and the mill was doing very satisfactory work.

Planting was still being carried out with fair to medium strikes. Most of the land was in a very fair state of cultivation, but several fields were not, the ground being lumpy and showing far too much half-dead grass; while upon others it was apparent by the number of old cane stools about that the crop had been harvested, ploughed out, and after another ploughing, replanted straight away. Using the whole stick for plants, and then cutting up whilst lying in the drills was also a practice observed on some Italian-owned farms. From a disease point of view that practice is strongly condemned.

Varieties.—H.Q. 426 (Clark's Seedling), Q. 813, M. 1900, and N.G. 15 (Badila) are about the principal varieties grown in this area, and are all very good canes on certain soils, H.Q. 426 giving very good returns in the early part of the season. Q. 813 is still gaining more friends, as it is such a good striker and gives such consistently good c.c.s. figures both early and late. M. 1900 is also a very suitable cane, coming to its best about the middle of September. Badila (N.G. 15) upon good alluvial is always good and is worth growing wherever such soils are. E.K. 28 has rapidly become popular in this area; and some splendid crops of it are being cut, carrying exceptionally good tonnage and very fair density values. Nearly every grower is trying to plant some of this cane this year. E.K. 1 is grown in small quantities, and one Glen Isla grower speaks very well of it. 7R. 428 (Pompey): Some good crops of this are being harvested, some ratoons yielding about 14 c.c.s., and nearly 25 to 30 tons per acre being noticed.

Diseases.—Red Rot and a little Mosaic are the main diseases noticed, with the first named easily the worst, especially in low badly-drained heavy soil. H.Q. 426 (Clark's Seedling) seems to suffer far more than any other cane, and in nearly all fields inspected of this cane it was seen from an odd stool or two, to quite a few sticks in a stool nearly dead. B. 208 (plant) was also noticed to be suffering from same in a Glen Isla farm, and Striped Singapore upon a hillside farm near Cannon Valley was in a bad way.

Growers are again advised to be very careful of their seed, throwing out any stick that shows the slightest sign of redness when being cut into plants.

Mosaic was noticed in an odd stool of N.G. 24B up river, and in M. 1900 and Malagache second ratoons slightly at Waterson.

The Southern Field Officer, Mr. J. C. Murray, reports, 16*th September,* 1927:—

MOUNT BAUPLE.

Crushing was in full swing at the time of visiting this district, and everything appeared to be going smoothly. The c.c.s. value of the cane was showing fairly high, particularly the H.Q. 285, Q. 822, and Q. 813; L.K. 1 and 28 were also growing satisfactorily. There is not sufficient of the two lastmentioned canes growing yet for a really definite opinion to form as to their general value in the Bauple area; nevertheless these varieties are well worth a more extensive trial, and the growers are advised to give further trials to them.

It is to be impressed on the growers that variety experiment is of first-class importance. Every grower should carefully look after his collection, weeding out the useless ones and carefully selecting and developing those that are promising. The writer contends that, within reasonable limits, a cane can, by plant selection, be improved in every direction—thickness, length, sugar content, and resistance to disease.

Combined with selection should be careful tillage. Most growers cultivate well and carefully, but not many fully understand why they do so. In early times it was found by practising good cultivation nature gave of her best; now science can tell the farmer the reason why. Summarised are some of the benefits of good tillage:—

(*a*) Facilitates planting and ensuring a start over the weeds;
(*b*) Loosens soil and makes it fine;
(*c*) Makes soil drain better and keeps it warmer;
(*d*) Allows aeration of the soil; and
(*e*) Stimulates the work of friendly bacteria.

Farmers in the Bauple district are considering the planting of a percentage of Uba. While Uba is not looked upon with favour by a great many growers of sugar-cane, nevertheless there are some farmers who have had good results from this cane. Uba belongs to a group of varieties known as the Japanese canes.

Sugar-cane generally can be divided into four groups, namely:—

(*a*) The ordinary sugar-cane (*Saccharum officinarum*);
(*b*) The Hawaiian purple canes;
(*c*) The China canes; and
(*d*) The Japanese canes.

A remarkable feature about the latter group is their extraordinary resistance to Mosaic. As far as the writer knows, the only one of the Japanese canes growing in Queensland is the Uba.

Frosts affected the cane somewhat in the Bauple area this year, although very little cane within an eight-mile radius suffered. The heaviest cane observed coming to the mill was Q. 813.

BEENLEIGH.

Approximately a fortnight was spent in this area, principally in connection with the control of Fiji disease. It is safe to say that, if prompt action had not been taken by the Bureau, there would have been very little cane unaffected with Fiji disease in the Beenleigh district a few years hence. It is almost tragic to see the way big, well-grown stools of cane get cut down with this disease.

The farmers are advised to be constantly on the alert, and not to neglect to destroy affected stools as soon as they are located.

Rain is badly wanted in this area, the dry state of the soil seriously interfering with planting. Many of the Beenleigh farmers have been producing for forty years. It cannot be too strongly impressed on the old-established farmers, that they should do more green manuring and, after local experiment, fertilizing, if they wish to be fully compensated for their labour. Full information on carrying out experiments, fertilizing to try, green manures, &c., can be obtained on application to the Bureau.

In regard to varieties, the farmers are recommended to plant Q. 813 and H.Q. 285. The cutting period for these canes is—H.Q. 285 (Miltons), July, August, September; Q. 813, October, November, December. H.Q. 285 is not a standover cane.

Harvesting in the Beenleigh district was proceeding smoothly. The bulk of the haulage is done with horse wagons.

RECORDS OF AUSTRALIAN THYSANOPTERA (THRIPS).

By A. A. GIRAULT, B.Sc.

PART II.

The following records are new and form an addition to those published in the May (1927) issue of this Journal. From them can be gathered such information as occurrence and distribution of the various species and what species frequent each plant. They also show the almost universal occurrence of certain species. Each is numbered as formerly, and the same arrangements hold here. As formerly, the the Government Botanist, Mr. C. T. White, kindly identified most of the plants.

1. *Thrips tabaci* Lindeman.—This species is now found to be more abundant than was at first thought. A female, *Chrysanthemum*, Hawthorn, Victoria, May, 1927, R. Kelly; *Lantana sellowiana*, Morningside, 11th October, 1925; from chickweed, *Stellaria media*, in a garden, Norman Park, 17th July, 1927; *Nasturtium* and *Freesia*, garden, Brisbane City, 12th August, 1927, I. W. Helmsing; *Ageratum* or billy-goat weed, August, in Brisbane; *Convolvulus erubescens*, forest, Norman Park, 6th August, 1927; injurying eschalots, Sunnybank, 14th August, 1927, J. H. Smith; from roses, Mayne Junction, 22nd May and in August, 1927, A. R. Brimblecombe; cherry, Brisbane, 18th August, 1927; *Solanum nigrum*, Norman Park, 14th August, 1927; common in cultivated pea blossoms, Norman Park, 22nd August, 1927; *Chenopodium murale*, Brisbane, 17th August, 1927; Michaelmas Daisy, Mayne Junction, 21st August, 1927, A. R. Brimblecombe. At Brisbane, *Senebiera didyma*, 20th August, 1927; *Galinsoga parviflora* and *Cestrum parqui*, 26th August, 1927.

2. *Thrips imaginis* Bagnall.—From mango flowers, Brisbane, 11th August, 1927; Wentworth, New South Wales, 1st October, 1926, R. Kelly; from roses, see No. 14 in Part I.; white clover again, Brisbane, 17th August, 1927; cultivated flowers, Morningside, 5th September, 1925; *Acacia saligna*, Mildura, Victoria, 1st October, 1926; *Gallardia*, Melbourne, Victoria, December, 1925, R. Kelly; *Lyonsia reticulata*, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

3. *Pseudanaphothrips achætus* Bagnall.—Flowers of *Pultanœa* and *Convolvulus*, forest, Norman Park, May, 1927; *Leptospermum*, Morningside, 4th October, 1925, and cultivated flowers, 5th September, 1925; peach, Norman Park, 17th July, 1927, and on same date, same place, *Stellaria media*; *Lantana sellowiana*, Morningside, 11th October, 1925; *Pimelea linifolia* and *Tridax procumbens*, forest, Norman Park, 10th and 25th April, 1927. At same place on *Boronia polygalifolia*, May, 1927, and *Lobelia purpurascens*, April, 1927; also in May, 1927, on flowers of *Goodenia bellidifolia* and *Velleia spathulata*, on *Convolvulus erubescens* and *Goodenia rotundifolia*, 6th August, 1927, and on cultivated pea blossoms, 13th August, 1927. White clover, Norman Park, 28th November, 1926; *Wahlenbergia gracilis*, forest, Norman Park, 14th August, 1927; geranium, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

4. *Physothrips kellyanus* Bagnall.—Mango flowers, Norman Park, 11th August, 1927; also on 23rd July. From miscellaneous cultivated flowers, 25th April, 1927, Brisbane, A. R. Brimblecombe; lemon and flame tree, 22nd May, 1927, Brisbane, A. R. Brimblecombe; many females, lemon, 21st August, 1927, Mayne Junction, A. R. Brimblecombe; again from *Cestrum parqui,* Brisbane, August.

5. *Physothrips mjöbergi* Karny.—From roses, Mayne Junction, 22nd May, 1927, A. R. Brimblecombe; from cultivated flowers, same place, 25th April, 1927, A. R. Brimblecombe; *Plumeria rubra* (Frangipani), Botanic Gardens, Brisbane, 22nd April, 1927, A. R. Brimblecombe.

6. *Physothrips brevicornis* Bagnall.—On *Hypochœris,* Sherwood, 20th June, 1927, A. R. Brimblecombe; Aspley, 11th July, 1927, J. A. Weddell and S. M. Watson; Norman Park, 6th August, 1927; also very abundantly, same place, 13th August, 1927; on *Oxalis corniculata,* forest, Norman Park, 6th August, 1927.

In some of the above specimens (6th August) the head and prothorax were jet; in others abdomen quite pale excepting the last segment or two. In the specimen, a female, from the *Oxalis,* antennals 4-5 were dark on one side.

7. *Thrips lacteicorpus* Girault.—Mango, Norman Park, 4th August, 1927; on 2nd July, 1927, at the same place, very common in the flowers of the golden wattle and of two other wattles in August, 1927. Clover, Brisbane, 17th August, 1927; cherry, Brisbane, 18th August, 1927, and peach, same place, the day following. Strawberry, Raby Bay, 19th August, 1927, J. H. Smith; mango, Mayne Junction, 21st August, 1927, A. R. Brimblecombe; lemon, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

8. *Isononeurothrips australis* Bagnall.—Mango, Norman Park, 5th August, 1927. The *Cocos plumosa* record of Part I. was from Morningside; and the species was obtained from *Eucalyptus* and *Leptospermum* flowers, at the same place, 4th October, 1925. Flowers, Wentworth, New South Wales, 1st October, 1926, R. Kelly; one female, lemon, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

9. *Idolothrips marginatus* Haliday.—Brigalow, Wallumbilla, 9th March, 1924; forest, Stanthorpe, 24th April, 1924; jungle, Montville, 16th September, 1923.

10. *Idolothrips lacertina* Haliday.—A male, flowers *Ægiceras majus,* Brisbane, 18th July, 1927, W. A. T. Summerville.

11. *Desmothrips bagnalli* Karny.—Forest, Banyo.

12. *Desmothrips tenuicornis* Bagnall.—Forest, Kingston.

13. *Physothrips uniformis* Bagnall.—Common, *Helichrysum apiculatum,* Norman Park, 14th August, 1927.

16. *Cryptothrips dimidiatus* Hood.—One apterous specimen, forest, Dayboro, 8th October.

18. *Physothrips cinctipennis* Bagnall.—Flowers of *Mesembryanthemum,* Mayne Junction, Brisbane, 22nd May, 1927, A. R. Brimblecombe; and of *Dolichos lablab* and *Phaseolus lathyrnoides,* Brisbane, 16th April, 1927.

24. *Stylothrips brevipalpus* Karny.—Flowers of *Tridax procumbens,* Brisbane, 16th April and 10th May, 1927; on cultivated Michaelmas

Daisy, Mayne Junction, 15th May, 1927, A. R. Brimblecombe; flame tree, same place, 22nd May, 1927, A. R. Brimblecombe; white clover, Brisbane, 17th August, 1927; from *Eclipta alba* and *Galinsoga* again, City, Brisbane, 17th August, 1927.

28. *Horistothrips australiæ* Morgan.—Two females, forest Stanthorpe, 24th December, 1923. The head in this species exceeds the prothorax.

31. *Neophysopus fragariæ* Girault.—Strawberry, Manly, 18th September, 1924, H. Tryon. Many specimens both sexes injuring fruit of same, "rusting" it, Wynnum, 27th July, 1927, H. Tryon.

32. *Phibalothrips rufiventris* (Girault).—Forest, Kingston.

33. *Hydatothrips poeta* Girault.—A female, forest, Gordonvale. The tibiæ and most of the second and third pairs of femora in this specimen were yellow. The species is correctly placed.

34. *Polyphemothrips brunneicorpus* Girault.—A male, forest, Mount Gravatt, near Brisbane, 11th May, 1923.

35. The notes in first part refer to a distinct variety *alighierini* Girault.

37. *Frankliniella æschyli* Girault.—Flowers of watermelon, Raby Bay, 24th February, 1927; from wild flowers, *Pultenæa* and *Convolvulus*, Norman Park, May, 1927.

38. *Heliothrips bifasciipennis* Girault.—A female from greenhouse plants, Queensland Museum, Brisbane, 17th August, 1927.

39. *Plesiothrips perplexus* (Beach).—On maize, Gympie, December, 1924.

40. *Odontothrips australis* Bagnall.—A female, *Glycine tabacina*, Norman Park, April, 1927; *Jacksonia*, same place, 14th May, 1927.

41. *Anaphothrips keatsi* (Girault).—This species was originally described from *Hibbertia stricta*. In April, 1927, many young larvæ and adults were found clustered upon unopened flower buds of the same plant at Norman Park. On 6th August, 1927, in the same place, adults were found abundantly, but no larvæ. The latter are of an orange colour.

42. *Horistothrips clavispilus* Karny.—Females, forest, Ipswich, June, 1919; Redland Bay, 23rd February, 1926.

43. *Cryptothrips finlayi* Girault.—A female, forest, Nambour, 21st October, 1923.

44. *Haplothrips partifuscipennis* Girault.—A female, mango blossoms, Norman Park, 3rd August, 1927; also 18th August, 1927.

This species was at first mistaken for *victoriensis*, but it has a tarsal tooth in both sexes, only the bases narrowly of the antennals 3-4 are pale (the head is longer than wide in both) and the wings are clear at each end. Moreover, tibia 3 is pale at base, antennal 4 is not enlarged and the bristles of dorsal abdomen from base are not stout.

A pair from cotton, Sunnybank, 8th June, 1923, F. G. Holdaway and J. H. Simmonds.

45. *Cryptothrips schilleri* Girault.—From galls on *Bursaria spinosa*, Healsville, Victoria, 27th November and 18th January, 1925, R. Kelly.

46. *Cryptothrips cybele* Girault.—A male, forest, Grandchester, 1st August, 1924. In this specimen the third antennal joint was suffused dusky. Also a pair in forest sweepings at Laidley, 31st May, 1923. The female has no tarsal tooth.

47. *Haplothrips froggatti* Hood.—A female, forest-brigalow, Mount Larcom, 3rd February, 1924; a male, forest, Wynnum; two females, forest, Gympie, 9th October, 1924; a female, brigalow, Wallumbilla, 9th March, 1924.

48. *Androthrips niger* Girault.—A second male, type locality.

49. *Mesothrips atrellus* Girault.—Forest, Wynnum, November.

50. *Haplothrips robustus* Bagnall.—The species *varius* Hood and *melanoceratus* Bagnall are synonyms. The species has a wide distribution, and in some places is found plentifully in hay. Many specimens on *Ptilotus*, Anakie, Victoria, 12th December, 1926, R. Kelly; a male, among many specimens of No. 51, was found in a collection made from cultivated Michaelmas Daisy, Mayne Junction, 22nd May, 1927, A. R. Brimblecombe; also from *Leptospermum scoparium*, Yeringberg, Victoria, 7th January, 1926, R. Kelly; and a female from cultivated flowers, Brisbane, August, 1927, A. R. Brimblecombe. The wings of this last were considerably narrower and the fore tibia black.

51. *Haplothrips gowdeyi* (Franklin).—This species is doubtless one of the commonest members of the order and is subcosmopolitan. In Australia it is perhaps the commonest species with the possible exception of Nos. 1, 2, and 3. It is by far the commonest tube-bearing thrips. The following records have accumulated:—

Strawberry, Raby Bay, 13th July, 1927, J. H. Smith; cultivated Gerbera and Daisy, Mayne Junction, 15th May, 1927, A. R. Brimblecombe; *Lobelia purpurascens*, forest, Norman Park, April, 1927; abundant on *Mesembryanthemum* and cultivated flowers, Mayne Junction, 22nd and 25th May, 1927, A. R. Brimblecombe; *Amaranthus*, Brisbane, 13th April, 1927; Morning Glory and *Phaseolus*, Brisbane, 16th April, 1927; in sweepings in waste jungle, Flaxton, 3rd July, 1923; flowers of *Commelina cyanea*, *Panicum crus-galli*, and of water-melon, Raby Bay, 24th February, 1927; *Thunbergia alata*, Brisbane, 16th April, 1927; *Tridax procumbens*, Norman Park, 10th May, 1927; grass, same place, February, 1927; strawberry (larva on fruit), Wynnum, 27th July, 1927, H. Tryon; eschalot, Norman Park, 7th August, 1927; white clover and cultivated flowers, Brisbane, 17th August, 1927; *Goodenia rotundifolia*, Norman Park, 6th August, 1927; cultivated flowers, Brisbane, August, 1927, A. R. Brimblecombe; *Ageratum conyzoides*, Brisbane, 11th August, 1927; mango, 23rd July and *Hierachium*, 23rd February, 1927, Norman Park; lantana, Montville, 16th December, 1925; dandelion, Aspley, 11th July, 1927, J. A. Weddell and S. M. Watson; *Chenopodium murale*, Brisbane, 17th August, 1927; Michaelmas Daisy and geranium, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

In all the above specimens the sixth antennal segment was never clear yellow and sometimes the fourth and fifth were more or less infuscated.

52. *Thirps io* Girault.—Flowers of orange, at Mapleton, January, 1926 (with *Physothrips* spp.), and at Roma, 26th August, 1926, J. H. Smith. This is a puzzling species founded on males. It differs from *lacteicorpus* male solely in not having the upper vein of fore wing regularly setose but with only three well-developed setæ from middle.

53. *Thrips fortis* Bagnall.—A female, forest, Stanthorpe, 24th April, 1924. The head was not quite as long as pronotum and the setæ between the post-laterals were dark, rather strong, and increasing in size towards meson. However, the specimen agrees otherwise and I think must be this species.

54. *Haplothrips nigroculex* Girault.—This is perhaps the next most common species of Tubulifera. It differs from *froggatti* in not having antennal 3 dark and distinctly much shorter than 4. In this species, the third segment of the antenna also exceeds segment 2, whereas in *froggatti* it is shorter than segment 2. I have seen specimens with the distal subbasal bristle capitate and with the post-ocular of one side closer to cheek than to eye. I have seen the following specimens since describing the species:—

A male on asparagus, Lakes Entrance, Gippsland, 22nd February, 1919, R. Kelly; *Cyperus pilosus*, 26th January, 1926, Morningside; *Bursaria spinosa,* Yeringberg, Victoria, 7th January, 1926; *Kunzia,* Warburton, Victoria, 12th December, 1924, R. Kelly; forest, Mareeba, 11th March, 1919; *Eucalyptus piperata*, Yeringberg, Victoria, 7th January, 1926, R. Kelly; upon opening buds, Mount Glorious, 12th September, 1926, W. A. T. Summerville; *Verbena erinoides,* Roma, 3rd December, 1925; Watsonville, 12th March; forest, Tumoulin-Ravenshoe, 12th March, 1919; forest, Herberton, 11th March, 1919; *Glycine tabacina,* forest, Norman Park, April, 1927; forest, Bakersville, 15th March, 1919. Also at Brisbane on *Acacia* and *Crotolaria,* 24th August, 1927. *Cassinia aculeata,* Yeringberg, 7th January, 1926, and *Eucalyptus rostrata,* Sutherland's Creek, Anakie, Victoria, 26th December, 1926, R. Kelly; forest, Mount Gravatt, 11th May, 1923; Gympie, 29th June, 1924; forest, Kingston; buffalo grass, Mayne Junction, 21st August, 1927, A. R. Brimblecombe; by the same, same place, 28th August, *Lyonsia reticulata.*

55. *Haplothrips victoriensis* Bagnall.—A female from lemon flowers, Mayne Junction, 21st August, 1927, A. R. Brimblecombe. The bristles on dorsal abdomen are much stouter and darker in this species than in No. 44.

56. *Desmothrips australis* (Bagnall).—A female from strawberry blossoms, Raby Bay, 23rd August, 1927, J. H. Smith. The legs are entirely black.

57. *Hydatothrips argenticinctus* Girault.—A male and several females of this beautiful species from the flowers of *Lyonsia reticulata,* Mayne Junction, 25th August, 1927, A. R. Brimblecombe. Mr. Brimblecombe first collected this species.

58. *Neophysopus io* Girault.—Rather abundant upon the flowers of the vine *Lyonsia reticulata,* Mayne Junction, 21st August, 1927, A. R. Brimblecombe. The larvæ apparently differ from those of *fragariæ* by bearing wide, short, funnel-shaped lateral abdominal setæ.

"A WEALTH OF INFORMATION."

Thus a Mulgeldie subscriber (25th July, 1927): "Many thanks for past Journals, which have contained a wealth of information to the man on the land."

FARM TRACTORS.

By E. T. BROWN.*

When considering the power that is required to draw a plough through the soil a very important point to take into account is the evenness of the ground. Any rise will, of necessity, call for a greater amount of power. It is extremely difficult to estimate with any degree of accuracy what is the exact increase in power required, but there is a method of working out this point which is more or less satisfactory. The result arrived at is not as regards the extra power that is required, but as concerns the decrease in the available power at the drawbar. But this, of course, amounts to exactly the same thing in practice. For every 1 per cent. of gradient 1½ per cent. of the total weight of the tractor and the plough must be deducted from the effective pull. Let us take a case in point. Say, the weight of the outfit is 45 cwt.; the gradient is 1 in 25 or 4 per cent.; and the drawbar pull is 1,500 lb. Deduct 4 times 1½ or 6 per cent. of 45 cwt. (5,040 lb.), which is 302 lb. from 1,500 lb., thus leaving an answer of 1,198 lb. On a 1 in 25 gradient, therefore, the effective drawbar pull is 1,198 lb.

The Question of Wheels.

A considerable proportion of the power generated by the engine is required for the propulsion of the tractor and the fitting of suitable lugs to the wheels makes all the difference in the amount of available power at the drawbar. When this is realised, it will be easily understood that the size and width of the wheels fitted to the tractor will exert a great influence on the ease with which it can be propelled. It is not only that soil compression depends largely on these two factors, important though this point is, especially when working on some soils. A wheel of small diameter will sink considerably deeper into the soil than one will that has a greater circumference. Since the point of contact, moreover, is less with a small wheel the soil will be packed more. This brings us to the question whether it is not possible to get rid the soil compression effect without increasing the diameter of the wheels. Increasing the width of the rims of the wheels will spread the pressure over a greater area of ground and will bring about the desired result, but only to a certain extent. It will decrease the depth of the compression, but it will spread it over a greater area, and this is just one of the things that we want to avoid. There is another reason why a wide wheel is not suitable. It is found to be very awkward in turning the tractor, since there can only be one true rolling point of contact with the ground, and, therefore, this necessitates one edge slipping backwards and the outer edge being driven forward. When gripping devices are fitted this tends to tear up the ground more than is desirable.

The Best Sizes.

It has been proved in practice that for a medium powered machine a 12 in. to a 14 in. wide wheel is the greatest that can be employed on good ground. Manufacturers have also proved that a 5 ft. diameter driving wheel can be fitted without causing any structural weakness, but that it is not advisable to exceed this measurement. These are the figures for good ground, but when working in very soft soil, it is possible to attach extension rims to the rear wheels, and in this way the advantages of a wide wheel are retained without any of the disadvantages. The extension, however, must be removed before working again on hard ground. A wheel of a fairly large diameter possesses another advantage over a smaller wheel. It is able to surmount obstacles more easily, and, therefore, less power is utilised on rough ground for the propulsion of the tractor. This is a point that is very frequently forgotten by tractor operators, but it exerts a distinct influence on the available drawbar pull.

Brake Adjustment.

Most tractors are fitted with the internal expanding or external contracting type of brake. Each is easy to adjust, and should be set in such a way that there is no friction when the brake is not being used, yet it should grip well when it is applied. From time to time it may be necessary to reline the shoes, but this is quite a simple job, and any good amateur can manage it. The best lining to employ is that made of asbestos and brass wire woven together, and this can be obtained from any motor store or garage. Holes should be drilled in the fabric to correspond with the holes in the shoes and copper rivets should be employed. The holes must be countersunk so that the rivet heads will sink well into the fabric. Inattention to the brakes may result in a serious accident, and thus they should always be kept correctly adjusted.

---

* In the "Farmer and Settler."

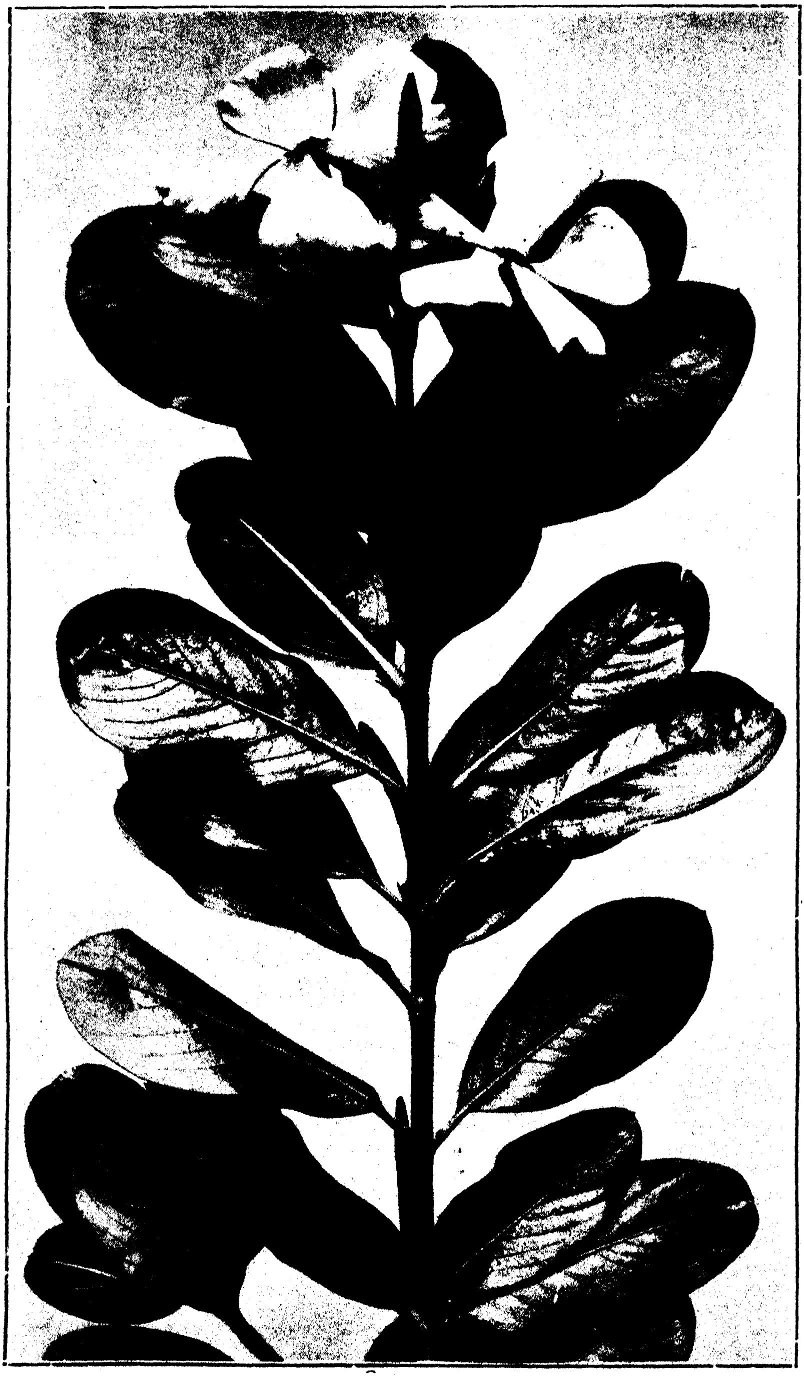


Plate 96.—Vinca rosea, a Reputed Cure for Diabetes.

VINCA ROSEA—A REPUTED CURE FOR DIABETES.

By C. T. WHITE, Government Botanist.

In the "Queensland Agricultural Journal" for February, 1925, I wrote an article on the reputed value of *Vinca rosea* as a cure for diabetes. The article was reprinted or referred to in many newspapers and magazines, with the result that a big correspondence resulted and the available stock of reprints soon became exhausted.

Since the article was written the plant has gained a great deal of favour, and some rather wonderful accounts of its value as a curative agent have been given to me.

It was Mrs. H. N. Uffindell, of Lower Mitcham, South Australia, who first drew my attention to the use, in South Africa, of the herb Vinca as a cure for diabetes. Mrs. Uffindell, hearing that the plant was a common weed in Queensland, wrote requesting a supply of leaves, and at the same time enclosed a cutting from a South African paper giving the following directions for the use of the plant.

Vinca Treatment of Diabetes.

Each day boil twenty-seven leaves in three and a-half cups of water for fifteen minutes, then strain. Take one cup after each meal; one hour afterwards as much bicarbonate of soda as can be got on a sixpence in half a glass of warm water. Diet consists of all green vegetables, meat three times a day, game, fowl, or bacon for a change, some apples. Avoid ordinary bread.

In South Africa, Mr. E. E. Whyte, the discoverer of the value of Vinca in diabetes, has put up a proprietary medicine termed "Covinca," for which it is claimed that eight out of every ten cases of sugar diabetes will find the use of Insulin and strict dieting unnecessary.

As the plant is a very common weed in Queensland, the following description and accompanying illustration are published for the use of sufferers who may care to make a trial as to the efficacy or otherwise of the plant. It most commonly occurs along sandy beaches, particularly from Maryborough northwards; about Brisbane and more southern localities it is not so common, but may often be seen as a stray from garden culture.

Two varieties or forms occur, the one with pink (the type) and the other with white flowers (var. *alba*); the properties are most probably the same in both.

Description.—A perennial herbaceous plant 1 to 2 ft. high. Leaves arranged in opposite pairs, elliptic in outline, 1½ to 2½ in. long, nearly 1 in. broad tapering at the base to a short stalk of about ¼ in. Flowers borne in the uppermost leaf axils; calyx green about ¼ in. long divided to about the middle into five narrow lobes; corolla with a slender tube a little over an inch long dividing at the apex into five flat pink or white lobes 1½ in. across; lobes obovate rather lop-sided, much narrower towards the base. Seed capsules in pairs, long and narrow, about 1¼ in. long, full of small black oblong seeds, each seed about one line long.

Distribution.—A native of the West Indies and Tropical America, now naturalised in most of the warmer parts of the world.

Common Name.—Species of the genus Vinca are commonly known as Periwinkle.

Botanical Name.—*Vinca*, from the Latin *vinculum*, a bond or fetter in allusion to the twining shoots of some species of the genus; *rosea*, Latin referring to the pink colour of the flowers of the type.

Botanical Reference.—*Vinca rosea* Linnæus, species Plantarum 305.

A GRATEFUL FARMER.

A Marburg farmer writes (5th August, 1927): "As I am a subscriber to the 'Queensland Agricultural Journal,' I take this opportunity of expressing my gratitude to your branch of the Government for the circulation of this valuab'e book. No farmer should be without it."

CRATE PACKING OF BANANAS.

For some time Mr. William Leslie, Assistant Instructor in Fruit Culture, has interested himself experimentally in the packing and transport of bananas. In replying to an inquiry from a grower who is also engaged in the retail trade on the subject of banana transport in whole bunches, so that they might arrive unblemished at the point of delivery, Mr. Leslie had this to say, *inter alia*:—

CRATING BANANAS.

With reference to inquiry *re* the transport of bananas in whole bunches with a view to their arrival at their destination quite unblemished—viz., minus the usual bruises and discoloration—I have to state as follows:—

(1) Naked bunches of bananas are carried in specially constructed holds of steamers from the West Indies to ports in the British Isles and in America.

(2) Such bananas are almost invariably of the Gros Michel variety, which, owing to its tough skin, is not readily bruised, and is therefore fit for this mode of transport.

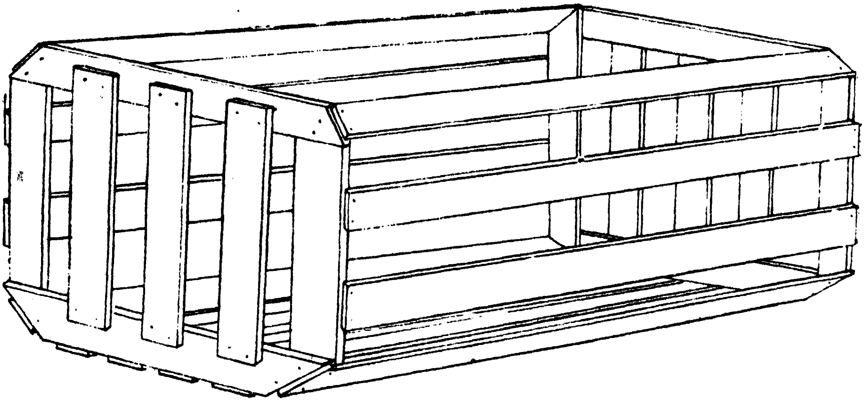


PLATE 97.—DOUBLE BANANA CRATE, AS USED BY CANARY ISLAND SHIPPERS.

16 sides—⅝ in. x 2½ in. x 26 in., 28 in., 30 in., 32 in., 34 in., or 36 in.
6 ends—¼ in. x 2½ in. x 14 in.
4 head-pieces—⅝ in. x 22/27 in. x 2½ in.
4 head-pieces—⅝ in. x 12/17 in. x 2½ in.

30 pieces to each crate.

(3) As the variety grown in Queensland generally is the Cavendish, which has a soft skin and easily bruised, carrying naked bunches in the above manner would result in considerable loss, and the plan adopted by the growers in the Canary Islands would be more suitable, for there the Cavendish is the common variety grown and the fruit is exported to Britain in specially made crates. I propose, therefore, giving you a description of the method from what I have seen of it in the Canary Islands, also during numerous voyages between the Canaries and Britain by the Elder Dempster line of steamers which convey the fruit. While taking part in the distribution of these bananas in the United Kingdom I observed details which may prove helpful in the present inquiry.

Crates are used and straw or banana trash is used as a lining for the crates, and each high-quality bunch is rolled in a sheet of cotton wool before being packed. The lower qualities are often packed only in the straw and without the cotton wool.

Careful handling of the bunch is requisite at all stages, but bruises are most likely to occur on the plantation previous to placing in the crate.

The bunches should not be laid on their sides nor on their points, but on the stalk end where the stalk is cut, so that it protrudes sufficiently to take the whole weight of the bunch, none of the fingers touching the ground or floor.

Packed in this manner the bananas are carried successfully, not only to distant ports, but also through many handlings and long railway journeys throughout the

United Kingdom. They are generally received by wholesalers who ripen them as required, and the fruit is turned out of the crates with unblemished skin—a beautiful golden yellow and seldom a speck or any discoloration.

I submit, therefore, that such a system of packing merits a fair trial in Queensland, with the prospect of conveying the fruit to Melbourne and other Southern markets, to arrive in superb condition and ripen without a speck.

The Practice in the Canary Islands.

Mr. Leslie also wrote to Elder Dempster (Grand Canary) Limited at Las Palmas, Canary Islands, from whom he received the subjoined interesting reply dated 21st July, 1927:—We are in receipt of your letter of the 26th May, and in reply have to inform you that there are no descriptive pamphlets on the packing of bananas here. We have pleasure, however, in giving you the following information, which we hope will be useful to you:—The bunch of bananas in Canary is first wrapped round with wadding, then wrapped in brown paper, and then packed in the crate, straw (or banana leaves dried) being used for packing in order to keep the bananas well away from the wood. This system of packing is necessary with the Canary banana, which, as you probably know, is very easily bruised. The crates are either "single" or "double"—that is, they contain either one bunch or two bunches of bananas, and the length of the crate varies in accordance with the size of the bunch. We enclose herewith sketches which we have made, together with full particulars of the dimensions, and if we can give you any further information we shall be pleased to do so.

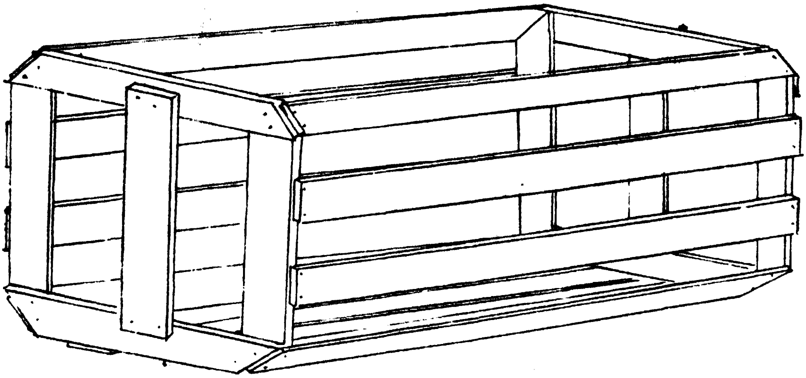


Plate 98.—Single Banana Crate, as used by Canary Island Shippers.

12 sides—⅝ in. x 2½ in. x 28 in., 30 in., 32 in., 34 in. or 36 in.
2 ends—¼ in. x 2½ in. x 14 in.
8 head-pieces ⅝ in. x $\frac{12}{17}$ in. x 2½ in.
—
22 pieces to each crate.

BANANAS IN THE NORTH.

Banana plantations in the Innisfail district are now recovering from the severe weather conditions experienced during last year and the early part of the present year. Fruit is now going forward to the Sydney market in increasing quantities. The quality is not yet of a very high standard owing to the severe set-back the plants suffered during the cyclonic blow in February last. Suckers that have come away since that time, however, give promise of an excellent crop later.

In regard to the packing of their fruit many growers are inclined to over-brand. By that I mean they grade their fruit into three sizes and mark them Special, Choice, and Standard respectively, irrespective of whether the fruit reaches the standard size for the grade or not. Buyers look on fruit so over-branded with suspicion, and will offer a lesser price than they would if it was correctly branded with a lower grade. Even though the three particular grade names are not now compulsory, they have come to be recognised on the market, and growers will be well advised to keep their fruit up to the grade sizes if they use those grade names.—S. E. Stephens, Inspector, Diseases in Plants.

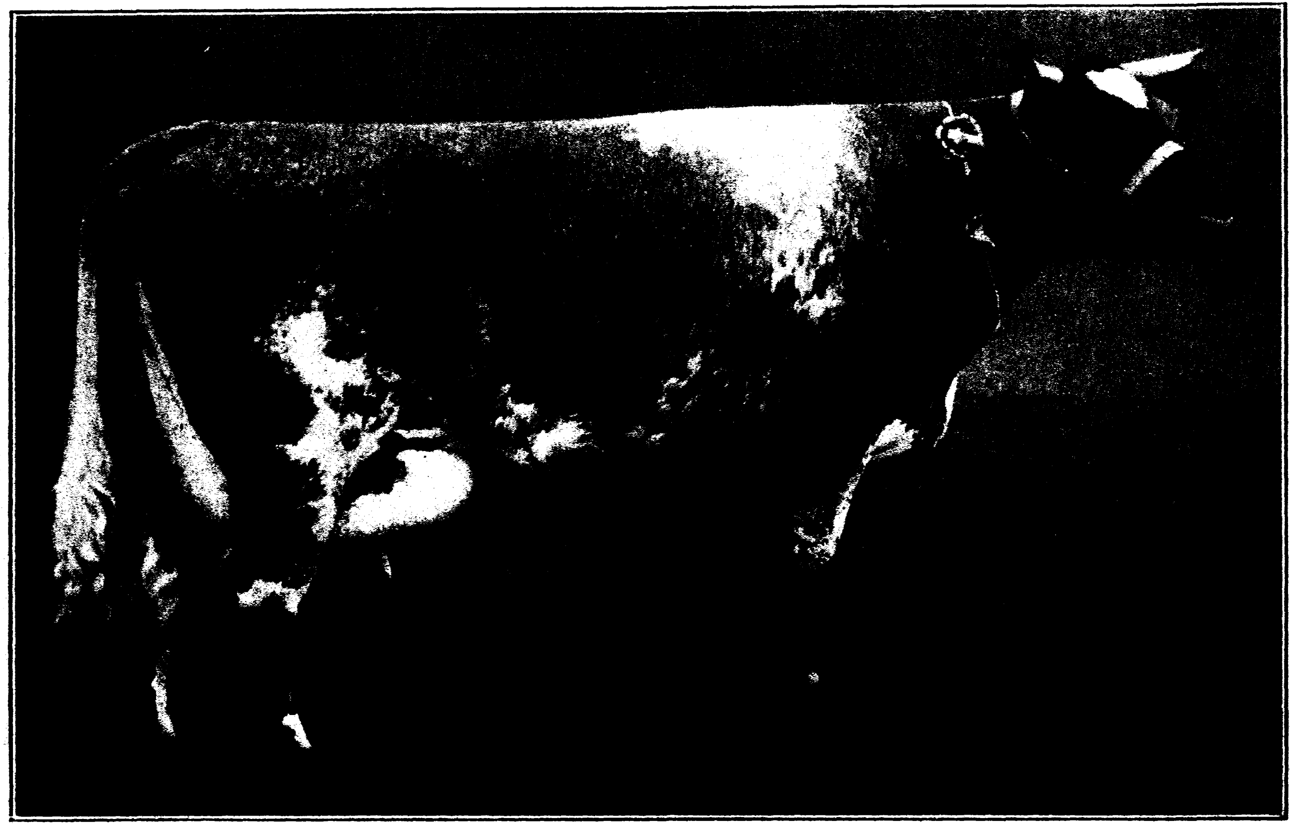


Photo.: G. H. Parsons.]

Plate 99.—British Breeds of Live Stock—Dairy Shorthorn.

This represents the type embodying the aims of British breeders (reproduced from "Farming," an English publication).

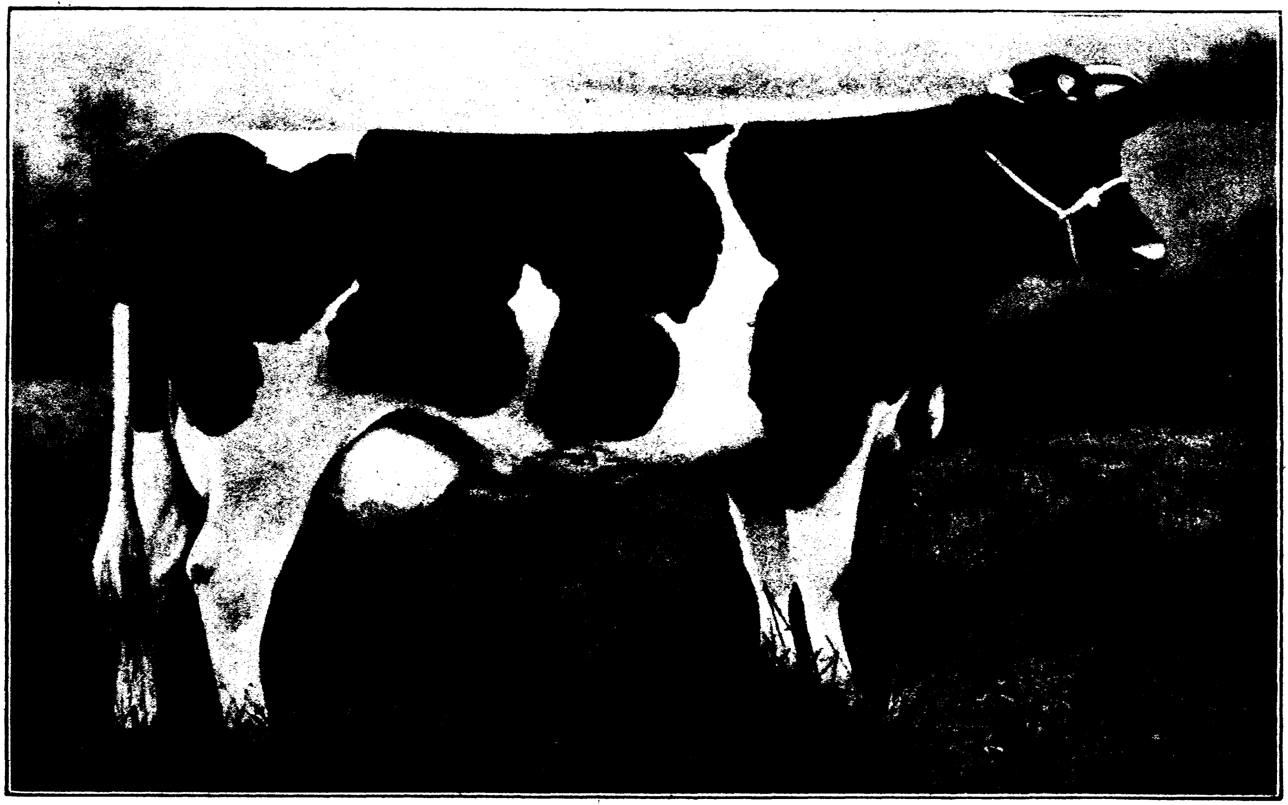


Photo.: Sport and General.]

Plate 100.—British Breeds of Live Stock—British Friesian.

A representation of the type aimed at by British breeders (reproduced from "Farming," an English publication).

CONTAGIOUS MAMMITIS IN CATTLE.

METHOD OF VACCIN TREATMENT.

By C. J. POUND, Government Bacteriologist.

This serious disease is continually being brought under notice through outbreaks occurring on dairy farms, and its spread may be attributed partly to the carelessness of the dairy farmer and partly to the want of proper hygienic methods of controlling it.

The disease is a catarrhal affection, and is limited in most cases to the delicate mucous membrane lining the milk ducts of the mammary gland. As a rule, there is very little heat or swelling; moreover, the affected parts are not particularly painful.

The disease is caused by a tiny chain-forming micro-organism, or streptococcus, which attacks the mucous membrane and, by the development of its poisonous products or toxins, causes a rapid destruction of tissue cells and leucocytes or white blood corpuscles which are attracted to the spot. These dead cells produce that peculiar feature of the disease—a yellowish purulent discharge or pus, which can be withdrawn from the affected quarter.

Symptoms.

In the acute form the first symptoms are a diminution in the milk yield (usually in but one quarter of the udder), a definite acidity of the milk, and a tendency for it to become rapidly coagulated. Gradually the milk assumes a dirty brownish colour and becomes more curdly, the amount of secretion from the affected quarter diminishing owing to the thickening of the milk ducts, which finally become impervious, and the whole quarter is rendered useless. The lesions develop slowly, and first one quarter and then another of the udder becomes involved, and later the milk secretion is liable to stop entirely. It will be observed in some cases that the milk does not appear to be curdled, and on settling the deposit is so very small as to be overlooked.

Methods of Transmission.

Undoubtedly the transmission of the disease from cow to cow is through the agency of the milker's hands or the cups of the milking machine. This appliance, which was designed to enable the farmer to produce cleaner milk than by any other method, must be kept scrupulously clean and be sterilised after each milking by means of repeated washings with boiling water. Before and after each milking of an affected animal the milker's hands and the teats and udder of the cow should be washed with some reliable disinfectant solution, such as Hycol, Kerol, or Cyllin, diluted in the proportion of one part of disinfectant to 250 parts of water—*i.e.*, one teaspoonful to one quart. Care must be taken not to allow any of the cream or milk from a healthy cow or any of the dairy utensils to become tainted with the disinfectant, as the flavour and odour might be detected in the butter. To obviate this, the disinfectant, after being allowed to act for ten minutes, should be washed off with sterilised water—*i.e.*, water that has been just previously boiled and allowed to cool.

Once the disease has appeared in a herd the owner should personally examine minutely every cow's udder before milking, and note carefully the character of the first small quantity of milk drawn. Any cow that shows signs of the disease, or that is in any way suspicious, should be held over to the last for hand milking, and on no account should the cups of the machine be used on her.

Milk from an affected cow must be considered dangerous. The cow should be milked last into a vessel kept specially for the purpose, and the milk scalded so as to destroy the mammitis germs. When it is cooled down it may be fed to the pigs.

Treatment.

Both preventive and curative treatment have been successfully carried out by means of vaccin prepared at the Stock Experiment Station, Yeerongpilly. When used as a preventive the vaccin confers a period of immunity to contagious mammitis which varies considerably in individual animals. In no case, however, is it thought that this period exceeds twelve months.

A stock vaccin may prove useful as a curative, but the best results are usually obtained from the use of an autogenous vaccin—*i.e.*, one prepared from the particular strain of germ affecting the animals it is proposed to treat. To prepare such a vaccin it would be necessary for the Government Bacteriologist, Stock Experiment Station, Yeerongpilly, to receive about 1 oz. of strippings from the affected quarter of a cow, in a clean bottle with no preservative added. A few days are required to prepare the vaccin, which will remain potent for about six months.

The vaccin is injected into the loose subcutaneous tissue behind the shoulder in the same manner as tick fever inoculation is performed, and the ordinary tick fever inoculating syringe and needle are necessary to do the work.

DENHAMS

LIMITED

Roma Street, Brisbane

Manufacturers of Chick, Calf, Cattle, and Pig Foods

D

The Formulas, as required by "*The Stock Foods Act of 1919,*" have been deposited with the Department of Agriculture and Stock.

We invite you to compare the ingredients, also Analyses of Foods, with other Stock Foods on the market. We confidently assert our Foods are better value.

CALF FOOD

Ingredients—Wheat Meal, Pollard, Oat Meal, Barley Meal, Maize Meal, Linseed Oil Meal, Meat-Bone, Blood Meal, Cod Oil.

Analysis—Crude Protein: Min., 15%; Crude Fat: Min., 5%; Crude Fibre: Max., 7%. **Price**—21s. per 100-lb. bags; 11s. 6d. per 50-lb. bags; 6s. per 25-lb. bags.

GROWING MASH

Ingredients—Wheat Meal, Bran, Pollard, Barley Meal, Rice Meal, Maize Meal, Linseed Oil Meal, Meat-Bone, Blood Meal, Salt, Sulphur.

Analysis—Crude Protein: Min., 15%; Crude Fat: Min., 4%; Crude Fibre: Max., 4%. **Price**—14s. 6d. per 100-lb. bags

LAYING MASH

Ingredients—Wheat Meal, Bran, Pollard, Barley Meal, Rice Meal, Maize Meal, Linseed Oil Meal, Lucerne Meal, Meat-Bone, Blood Meal, Salt, Sulphur.

Analysis—Crude Protein: Min., 20%; Crude Fat: Min., 6%; Crude Fibre: Max., 9%. **Price**—14s. 6d. per 100-lb. bags.

CHICK FOOD

Ingredients—Wheat kibbled, Maize kibbled, Linseed Oil Meal, Meat-Bone, Blood Meal, Japanese Millet, Panicum.

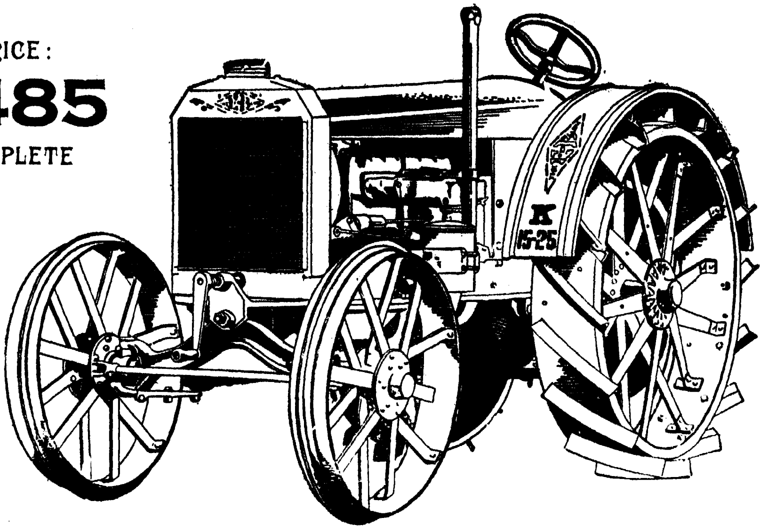
Analysis—Crude Protein: Min., 14%; Crude Fat: Min., 6%; Crude Fibre: Max., 4%. **Price**—16s. per 100-lb. bags; 8s. 9d. per 50-lb. bags.

Barley Meal, £11 per ton.
Maize Meal, £11 per ton.
Protein Meal, £14 per ton.

FARMERS!
You will need a man-size tractor this year

PRICE:
£485
COMPLETE

"The King of all Tractors."



E-B 15-25 Farm Tractor is the most economical Tractor in the World for draw bar pull. 10 years of dependable farming. Write for specifications and terms.

ESTABLISHED 1900
AUBURN
CARS

OFFER BETTER VALUE FOR 1927 THAN ANY OTHER AUTOMOBILE COMPANY

So sure are we that it will exceed anything that you have ever experienced before, that we invite you to test it. If it does not sell itself, you will not be asked to Buy.

COMPARISON PROVES

NOREMAC MOTORS LTD.
MAKERSTON STREET, BRISBANE

The full dose of vaccin in ordinary cases is 4 c.c., injected in two doses of 2 c.c. each, with a forty-eight-hour interval between the injections. Two injections of 2 c.c. will usually effect a cure, but in cases of long standing it might sometimes be found necessary to continue the treatment. Before the injections are commenced, the syringe and needle, after loosening the parts, should be sterilised by boiling in water for ten minutes, and the skin of the animal at the proposed site of injection should be treated with a solution of Hycol, Kerol, or Cyllin for ten minutes.

CONTAGIOUS MAMMITIS VACCIN—SCALE OF CHARGES.

No. of Animals.	Charge. s.	d.
1	2	6
5	6	3
10	10	0
20	16	8
40	30	0
60	40	0
80	46	8
100	50	0

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Aug.	Average Rainfall. No. of Years' Records.	Total Rainfall. Aug., 1927.	Total Rainfall. Aug., 1926.
North Coast.	In.		In.	In.
Atherton	0·86	26	0·12	0·65
Cairns	1·80	45	0·15	1·65
Cardwell	1·32	55	0·03	1·45
Cooktown	1·34	51	0·35	0·50
Herberton	0·67	40	0·07	0·31
Ingham	1·57	35	0·23	1·80
Innisfail	5·24	46	0·19	5·40
Mossman	1·46	14	0·10	0·90
Townsville	0·55	56	0	0·02
Central Coast.				
Ayr	0·64	40	0	0
Bowen	0·70	56	0	0·07
Charters Towers ..	0·61	45	0	0
Mackay	1·10	56	0·45	0·18
Proserpine	1·48	24	0·05	0·46
St. Lawrence ...	0·90	56	0·12	0
South Coast.				
Biggenden	1·12	28	0·53	0·12
Bundaberg	1·32	44	1·26	0
Brisbane	2·08	76	0·27	0·41
Caboolture	1·61	40	0·20	0·72
Childers	1·25	32	1·04	0
Crohamhurst ...	2·24	35	0·15	0·14
Esk	1·59	40	0·30	0·93
Gayndah	1·21	56	0 60	0·06
Gympie	1·79	57	1·42	0
Kilkivan	1·50	48	0·23	0·10
Maryborough ...	1·72	55	0·86	0·04
South Coast— continued:	In.		In.	In.
Nambour	1·97	31	0·07	0·10
Nanango	1·41	45	0·20	0·26
Rockhampton ...	1·01	40	0·72	0·08
Woodford	1·81	40	0·32	0·18
Darling Downs.				
Dalby	1·26	57	0·65	0·29
Emu Vale	1·24	31	0·19	0·33
Jimbour	1·27	39	0·15	0·13
Miles	1·22	42	0·20	0·44
Stanthorpe ...	1·88	54	0·33	1·45
Toowoomba ...	1·74	55	0·45	0·35
Warwick	1·57	62	0·19	0·41
Maranoa.				
Roma	1·00	53	0·12	0·08
State Farms, &c.				
Bungeworgorai ...	1·11	12	0·18	0·01
Gatton College ...	1·27	27	0·28	0·49
Gindie	0·79	27	0·7	0
Hermitage ...	1·48	20	0·22	0·28
Kairi	1·05	12	0	0·59
Sugar Experiment Station, Mackay	1·04	29	0·18	0·28
Warren	0·99	12	0·81	0

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

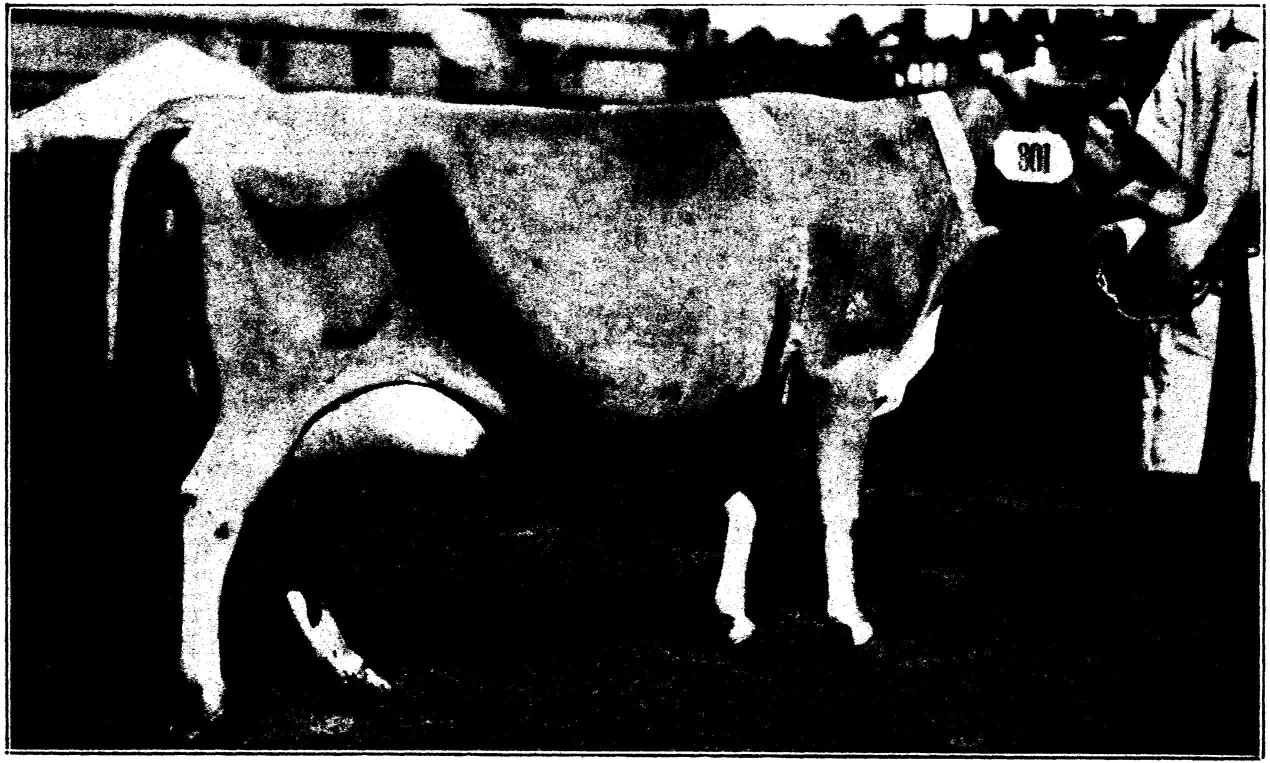


Photo.: " Live Stock Bulletin."

PLATE 101.—" OXFORD GOLDEN BUTTERCUP " (2387), BY " PRINCE PALATINE " (IMP.) (760), DAM " AUDAX BUTTERCUP " (829).

First prize Jersey Cow, four years old and over, dry; first for Australian bred cow; first in Breeders', Exhibitors', and Sires' Progeny Stakes groups; and Champion Jersey Cow for the fourth year in succession. Official Records: 8,997 lb. milk, 460·64 lb. fat in 273 days; and 2·285 lb. of butter in twenty-four hours. Bred and exhibited by Messrs. E. Burton and Sons, Oxford, Wanora, Queensland.

Photo.: "Live Stock Bulletin."

PLATE 102.—"TRINITY CORAL" (3357), BY "LORD ETTREY OF BANYULE" (1277), DAM "TRINITY BLUEBELL" (2590).

Second prize Jersey Cow, five years old and over, in milk; second in Sires' Progeny Group; second in Exhibitors' Group; and third in Sires' Progeny Stakes Group. She was first as a four year old at last year's Royal. Bred by and the property of J. Sinnamon, Trinity Jersey Stud, Goodna, Queensland.

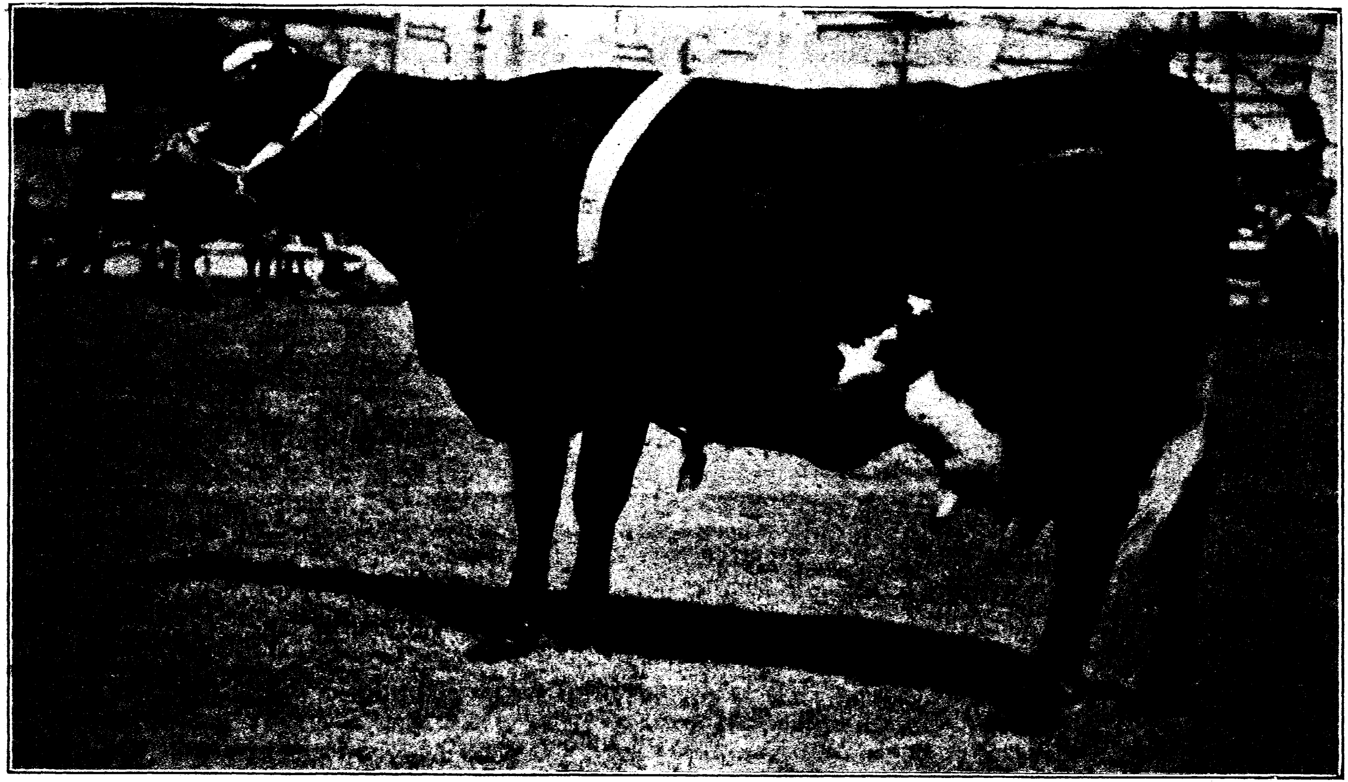


Photo. : "*Live Stock Bulletin.*"]

PLATE 103.—"ROSIE 4th OF GREYLEIGH" (152), BY "JOFFRE OF GREYLEIGH," DAM "ROSIE 3rd OF GREYLEIGH" (263).

First Prize I.M.S. Cow, five years old and over, in milk; first in Pen of Three Cows, over three years; second against all breeds for greatest Daily Yield of Butter-fat for 48 hours, with 2·5042 lb.; second for Largest Supply of Milk in 48 hours with 138·8 lb.; and Champion I.M.S. Cow for the second year in succession. Exhibited by and the property of A. J. Carswell, Dnalwon, Wangalpong, Queensland.

Photo.: "Live Stock Bulletin."

PLATE 104.—"OAKLEA SEGIS COLANTHA" (776), BY "OAKLEA KING SEGIS" (N.Z. 831), DAM "COLANTHA SOLKYE WIEMAN" (994). First prize Cow, four years old and over, dry; first in Exhibitors' Group; and Champion Friesian cow. Exhibited by and the property of E. J. Wecker, Tingoora, Queensland.

MILK IN THE HOME.

ITS AFTER TREATMENT BY CONSUMERS.

By C. J. POUND, Government Bacteriologist.*

The proper care of milk after it has been delivered to the consumer is a matter of great importance. It is desirable to have it in the best possible condition for use, and it is not desirable to blame the milkman for things for which he is not in the least responsible.

If the milk is kept in an open vessel in a refrigerator or ice chest with meats and various kinds of vegetables and fruit, it will absorb odours from them. It is also sensitive to flavours, and if allowed to stand in an old billy-can, the "tin taste" can be easily recognised. Milk should therefore be kept in a cool place free from odours and in a perfectly clean vessel of suitable material. A well-glazed earthen or porcelain jug, or an iron enamelled billy—in fact, a glass jar or bottle—are the best retainers, as with the use of a bottle brush, soap, and warm water they can be thoroughly cleansed. A tin billy is good, but only so long as the iron is well covered.

When milk is served soon after milking, in many cases it is not cooled by artificial means, and is supplied by dairymen who drive in twice each day delivering it as "warm from the cow." To many persons this is a guarantee of its purity, but milk served in this way will sour in a short time. During the summer months, within two or three hours after it is delivered, it is likely to be nearer a condition of sourness than milk twelve or twenty hours older which was cooled immediately after milking and kept at a low temperature.

Changes in Milk.

Pure as milk may be in its natural state, it is a perishable product, and although with a proper knowledge of its peculiarities and care in its keeping it can be held in a wholesome state a reasonable length of time, there are natural changes which are sure to occur as soon as opportunity is given. Thunderstorms, impurities, warm temperature, and other conditions known to exist when milk is most liable to give trouble, have been blamed for its changes; but it is now known that these are only indirect causes, and that changes in milk which bother the housekeeper are due to and cannot possibly take place without the presence of those minute organisms called bacteria.

It is extraordinary how strongly many people still adhere to the theory that thunder causes the souring of milk. The condition—the extra-heated atmosphere—which causes the thunder is also the same condition which facilitates the growth of lactic acid bacilli and the consequent souring of milk. No better proof that thunder does not cause this trouble is the fact that all the tubes and flasks of sterilised milk in our laboratory at Yeerongpilly remain unaltered through all the hot weather when thunderstorms are prevalent.

It has been demonstrated that by sterilising the milker's hands and the teats of the cow, milk free from bacteria can be drawn into a sterilised bottle, will undergo no change and remain perfectly sweet indefinitely. It is, of course, impossible to draw milk from the cow in such a manner that it will be free from bacteria except by the use of precautions absolutely impracticable in ordinary dairying. As milk is commonly drawn it is sure to be contaminated by bacteria, and by the time it has entered the bucket it contains frequently as many as half a million bacteria in every cubic inch of the milk. This seems almost incredible, but it has been demonstrated in many cases and it is beyond question.

Since these bacteria are not in the secreted milk they must come from some external sources. The first of importance is the cow herself; for while her milk when secreted is sterile, and while there are no bacteria in her blood, nevertheless the cow is the most prolific source of bacterial contamination. After each milking a little milk is always left in the ducts, and these furnish ideal places for bacteria to grow. Some bacteria from the air or elsewhere are sure to get into these ducts after the milking, and they begin at once to multiply rapidly. By the next milking they become very abundant in the ducts, and the first milk drawn washes most of them at once into the milk pail, where they continue their growth in the milk. Again, the exterior of the cow's body contains them in abundance. Every hair, every particle of dirt, every bit of dried manure, is a lurking place for millions of bacteria. The hindquarters of a cow are only too frequently in an uncleanly condition, for the farmer rarely grooms his cow, and during the milking, by her movements, by the switching of her tail and by the rubbing

---

* In a lecturette delivered from the Queensland Radio Station, 4QG, Brisbane.

Photo: "Live Stock Bulletin."]

PLATE 105.—"ROYAL GEORGE 2nd OF NESTLES" (288), BY "ROYAL GEORGE OF NESTLES" (50), DAM "NECKLACE OF TALGAI" (171).

First Prize I.M.S. Bull, four years old and over, and Champian I.M.S. Bull. Last year he was Reserve Champion at the Brisbane Royal, and in 1923 he was Champion of Queensland. Bred and exhibited by the Nestle and Anglo Swiss Condensed Milk Co., Toogoolawah, Queensland.

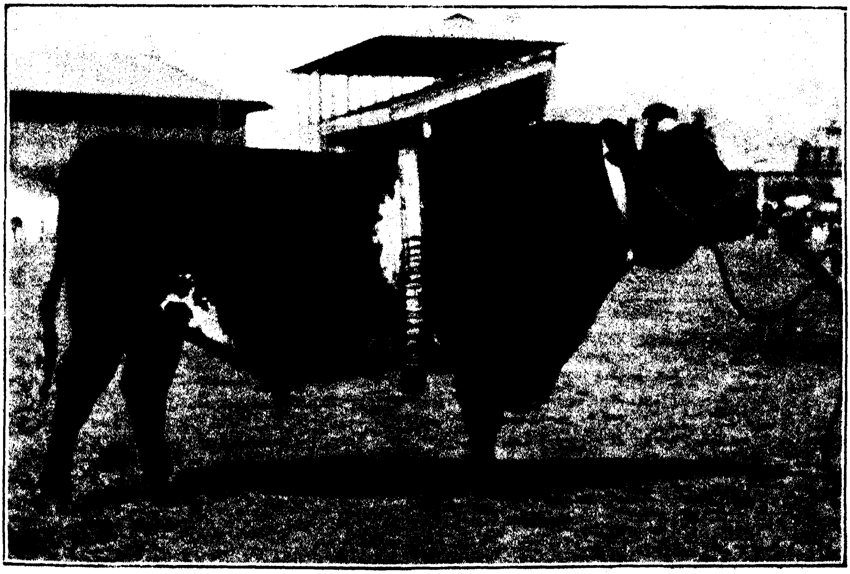


Photo.: "Livo Stock Bulletin."

PLATE 106.—"CHARM'S DUHALOW OF OAKVALE," BY "GEM'S PLUM OF HILLVIEW," DAM "CHARM OF GLENTHORNE."

Second Prize I.M.S. Bull, four years old and over; first or Sire and his Progeny; first in Exhibitors' Group; second in Sires' Progeny Stakes; and Reserve Champion I.M.S. Bull. Bred and exhibited by Mr. B. O'Connor, Oakvale, Colinton, Queensland.

she gets from the milker, no inconsiderable amount of this dirt and filth, including all kinds of deleterious micro-organisms, are brushed off and fall into the milk pail. The farmer understands this source of dirt, and usually feels it necessary to strain the milk after milking. But the straining it receives through a coarse cloth, while it will remove the coarser particles of dirt, has no effect upon the bacteria, for when one remembers many of them are only the one fifty-thousandth of an inch in diameter, they can readily pass through any strainer unimpeded. Again, the milk vessels themselves contain bacteria for they are never washed absolutely clean. After the most thorough washing which the milk pail receives from the kitchen, there will always be left many bacteria clinging to the cracks of the tin ready to begin to grow as soon as the milk once more fills the pail.

The milker himself contributes to the supply, for he goes to the milking with often unclean hands, unclean clothes, and not a few bacteria get from him to his milk pail. We also find the air of the milking stall furnishing its quota of milk bacteria, especially if the cattle are allowed to feed upon dusty hay or chaff before or during the milking. Last but not least we must not forget the direct contamination of the various dairying utensils by the ubiquitous fly, this entomological muck raker using as its breeding places the insanitary manure and garbage heaps to be found in the vicinity of the milking shed and dairy of many farms. We thus see how readily milk may become contaminated before it reaches the consumer.

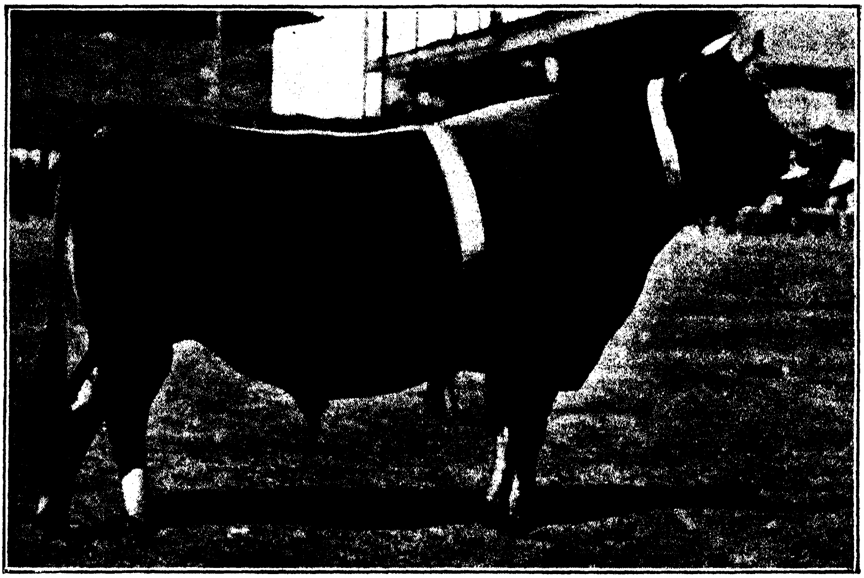


Photo.: "Live Stock Bulletin."

PLATE 107.—"TRINITY DARBY" (1720), BY "LORD ETTREY OF BANYULE" (1277), DAM "FERN'S CRYSTAL" (IMP.) (1332).

First prize Jersey Bull, four years old and over, and Champion Jersey Bull of Queensland. Bred by J. Sinnamon, Trinity Jersey Stud, Goodna, Queensland, and owned by W. W. Mallett, Nambour, Queensland.

The results of carefully conducted experiments indicate that it is possible for the average dairy farmer, without expensive equipment, to produce milk (practically free from visible dirt) which when fresh has a low bacterial count. By the use of the three simple factors—viz., sterilised utensils, clean cows with clean udders and teats, and the small top pail—it should be possible on the average farm to produce milk which corresponds closely to the milk as it leaves the udder of the cow. A fourth factor of holding the milk as near 50 deg. Fahr. as possible is also absolutely necessary to ensure its keeping fresh for a reasonable time.

In the absence of any improved conditions on the part of the dairy farmer, it must be obvious to everyone that all milk which affords such an excellent food for the growth of bacteria, particularly those that cause souring, must reach the consumer in a changing condition which may be gradual or rapid, depending entirely upon the surrounding temperature.

We all know that during the cold weather milk will keep and taste quite sweet for two days or longer, while during the hot summer days milk will soon taste sour and become curdled in a few hours after being received from the milkman.

The change to which milk is most liable is simple souring. The best agents to prevent this change are cold or heat. There should be no trouble in keeping milk sweet at a temperature of 50 deg. Fahr. after it is in the hands of the customer. This can be done if it is delivered in good condition, and properly handled after delivery.

It is the custom in some places to leave the milk in an open vessel on the doorstep early in the morning, and it remains there exposed to heat, dust, and insects, until wanted in the house. This is a dangerous practice. Too much care cannot be used in seeing that the milk is cold when delivered, and that it is then immediately put in a cool place. If allowed to stand in the warm air, it will only remain sweet for a little time. Sometimes milk does not keep sweet when no cause can be discovered for its souring. This is frequently the case in summer. Often the trouble is the refrigerator or ice chest, which may seem cold on account of the great difference between its temperature and that outside, while it is in fact not cold, and a thermometer may show its temperature to be even above 60 deg. Fahr.

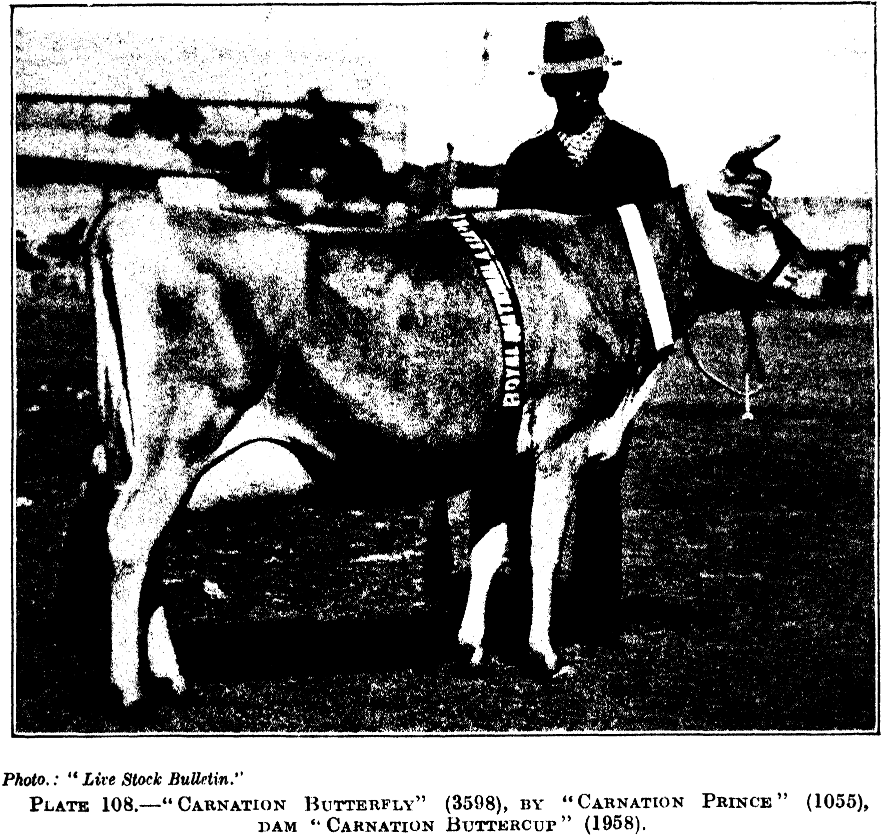


Photo.: "Live Stock Bulletin."

PLATE 108.—"CARNATION BUTTERFLY" (3598), BY "CARNATION PRINCE" (1055), DAM "CARNATION BUTTERCUP" (1958).

First prize, Jersey Cow, four years old and under five, in milk; third for Australian bred cow or heifer; first in Group of Sire and Three of his Progeny; second in Breeders' Group; third in Exhibitors' Group; second in Sires' Progeny Stakes; and Reserve Champion Jersey Cow, bred and exhibited by W. Spresser, Brassall, via Ipswich, Queensland,

We cannot expect to have good milk of safe quality without a realisation on the part of the farmer, dairyman retailer, and the housewife of the danger in utilising warm or dirty milk. Education is therefore an important factor in the improvement of the milk supply, which cannot be accomplished by laws and regulations alone. In view of these facts it is recommended that the subject be taught in the schools, that popular articles be prepared for the Press, that lectures and demonstrations be given in towns and all dairy-farming centres, and especially that rules and suggestions with reasons therefore be placed in the homes of dairymen and dairy attendants.

The importance of obtaining a hygienic and wholesome milk supply is recognised by all intelligent people and should require no argument. Next to bread, milk is more extensively used as an article of diet than any other foodstuff. It forms a portion of the food of almost every person on practically every day in the year. Moreover, unlike many other articles of diet, milk is consumed in most cases in an uncooked state, making it a very dangerous food should it perchance contain any deleterious germs. Therefore, under our present imperfect system of milk supply, it is recommended that all milk as soon as delivered to the consumer be subjected to pasteurisation.

Photo.: "Live Stock Bulletin."

PLATE 109.—"MINNAMURRA CHERUBINE" (948), BY "MINNAMURRA LADDIE" (198), DAM "MINNAMURRA DUCHESS" (506).

First Prize Guernsey Cow, three years old and over, dry; First in Exhibitors' Group; and Champion Guernsey Cow of Queensland for the third year in succession. She put up 1·49 lb. fat in 24 hours as a heifer. The property of Mr. Alan Cooke, Maleny, Queensland.

Theoretically pasteurisation should not be necessary; practically we find it forced upon us. The heating has certain minor disadvantages, but it is an efficient safeguard. The advantages of pasteurisation are that it not only enhances the keeping properties of the milk, but it is a cheap and effective means of preventing the transmission of infectious diseases such as tuberculosis, typhoid fever, diphtheria, scarlet fever, commonly spread by milk. It also has a favourable influence in preventing or ameliorating the severity of some of the intestinal disorders of children caused by impure milk.

The pasteurisation of milk in the home is an easy operation, and mothers and nurses should know how to do it, as the necessity may arise at any time. The treatment consists in heating the milk to a temperature usually between 140 deg. and 160 deg. Fahr., at which large numbers of bacteria including those causing the diseases previously mentioned are killed, and then cooling it to check the growth of others. In a domestic way this is best accomplished by heating the milk in a jug or preferably an enamelled billy with a lid placed in an outer vessel containing water which is brought up to boiling temperature, 212 deg. Fahr., and kept at that temperature for about fifteen minutes, while the temperature of the milk in the inner vessel will not rise above 170 deg. Fahr. It is then placed in another vessel of running cold water to cool rapidly, and afterwards kept in an ice chest or some cool place until required for use. Unless the weather be exceptionally warm such treated milk will remain perfectly sweet for twenty-four to thirty-six hours. If not required for immediate use the milk should remain in the vessel in which it was heated.

The following very simple device has the advantage of being within reach of any common household and obviates the possibility of the milk being overheated or the water in the outer vessel evaporating altogether through the person in charge being unavoidably called away:—

Photo.: "Live Stock Bulletin."

PLATE 110.—"MOOROOMBIN MAUD" (1343), BY "PABST ARROWHEAD" (IMP.) (204), DAM "MAUD ROOKER KORNDYKE" (IMP.) (589).

Second prize Friesian Cow, four years old and over, dry; and Reserve Champion Friesian Cow. Official records: 50¼ lb. milk, 1·778 lb. fat in 24 hours, and 11·097 lb. milk and 488 217 lb. fat in 273 days as a two year old. Bred and exhibited by Messrs. Brown Bros., Mooroombin, Toogoolawah, Queensland.

The vessel containing the milk is placed in a pail filled just above the level of the milk with boiling water. If allowed to stand for half an hour and then cooled the milk is practically pasteurised.

We all prefer pure milk, but so long as we cannot obtain it we must purify what we get, and pasteurisation is a cheap and efficient method of accomplishing this result.

The up-to-date idea of broadcasting from 4QG reliable information on agricultural matters, including milk hygiene, must meet with general approval; but to make the scheme the success it should be, something further must be done by way of encouraging the farmer and the members of the family to install in the home an inexpensive reliable receiving set.

THE PROBLEM OF THE TUBERCULOUS COW.

By ARTHUR GOFTON, F.R.C.V.S., Chief Veterinary Inspector, Edinburgh.*

Primarily, this Conference is concerned with Public Health questions, but it is not sufficient to consider the tuberculosis problem from the public health standpoint alone. To the economic side too little attention has been directed; it has been almost lost to sight in the greater prominence which has been given to the influence of the bovine disease on human health. The facts in connection with the latter are so well known that repetition would be superfluous. I do not propose, therefore, to do more than quote Dr. Stanley Griffith's figures as to the prevalence of the bovine disease in the human subject. His figures are chosen because there are no others which are more representative or which cover such a wide field. Further, Dr. Griffith's record of work in connection with tuberculosis enables him to speak with an authority which cannot be challenged. In Vol. XXIII. (1920) of the "Journal of Pathology and Bacteriology," Griffith reports that in an unselected series of 1,068 cases of human tuberculosis investigated in this country by identical methods, 20.7 per cent. were attributable to bovine infection. Examination of the figures shows an incidence of 37.55 per cent. of bovine disease in children under five years of age, with progressive diminution to 6.25 per cent. from sixteen years of age upwards.

From the point of view of animal health, there is no disease of cattle of even approximately equal importance in this country and none which is responsible to anything like the same extent for loss to the stockowner and to the community. At first thought there may be a temptation to question the truth of the latter statement in view of the large bills which the nation has lately been called on to pay as the cost of eradicating foot-and-mouth disease. But it will be realised on consideration that, over a period of thirty years, foot-and-mouth disease was quite negligible in its economic effects in this country apart from the altogether abnormal experience of the years 1922 to 1924. In any case, it is not possible to arrive at any comparable figure in respect of tuberculosis because, whilst the cost of foot-and-mouth disease is borne, for the major part, by the nation, and can thus be expressed in cash values, the loss from tuberculosis falls on a multitude of individuals, and no means exist whereby the necessary information can be collected and collated. Some facts, based on experience in Edinburgh abattoirs, will, however, be given in order to show the economic influence of bovine tuberculosis in comparison with all other diseases of cattle when considered collectively. It is further to be remembered that bovine tuberculosis continued to exercise its influence without modification year after year and, so long as the present policy of almost complete inaction remains in operation, bovine tuberculosis will continue to be responsible for a consistently recurring animal loss to the community.

During the three-year period, 1921-1923, the records of the Edinburgh abattoir show that tuberculosis was responsible for 82.35 per cent. (by weight) of carcasses condemned, 88.13 per cent. of heads and 44.12 per cent. of edible offal. With the exception of offal, which is of relatively small value, it will be observed that the whole of the non-tuberculous diseases (including traumatism) account for only a comparatively small fraction of the total condemnations. In an article published in "The Milk Industry," for March, 1924, I venture to make an estimate of the actual cost of tuberculosis as represented by slaughterhouse condemnations in the city. Taking a very low average of the prices current in the local dead meat markets during the year 1923, the sum of £5,000 was arrived at as the annual total. Edinburgh is only one meat-consuming centre and by no means the largest. There is no reason to suppose that the experience of Edinburgh differs in any material respect from experience elsewhere. It will be readily appreciated, therefore, that if the slaughter-house condemnations on account of tuberculosis throughout the whole of Great Britain be taken into account, they represent an annual loss of very considerable magnitude.

It must not be forgotten that slaughter-house experience is only part of the picture. The tuberculous animal is often slow and costly to feed. When ultimately sold in the fat stock market, loss rather than profit too frequently results. Many dairy cows are disposed of prematurely on account of tuberculosis during their most productive age period and entail a definite loss to the dairy. And there are the numerous miserable unfortunate piners which never reach an abattoir, but whose career is prematurely terminated at the knackery or by burial.

Sufficient has probably been said to make it clear that the economic aspect of the tuberculosis problem is only one degree less important, in the national interest, than the influence of the disease on human health.

---

* Presented to a recent conference of Veterinary Inspectors held in connection with a recent Royal Sanitary Institute Congress, Edinburgh, and reprinted from "The Veterinary Record" (London).

An effort to arrive at an estimate of the numbers of tuberculous animals which constitute an active danger to human health will perhaps serve a useful purpose. It is scarcely necessary to say that, in this connection, meat, in comparison with milk is relatively negligible as a medium of infection for man. The reasons which justify this statement have been so often expressed, and they are so obvious, that repetition is unnecessary.

Published records of the incidence of tuberculosis in Great Britain are relatively few and, in most cases, they do not embrace a large number of animals. It is, however, generally estimated that 40 per cent. of all dairy stock are affected with tuberculosis and, taking cows of all ages into consideration, this figure is approximately correct. When the majority of the animals under consideration are of mature years, that is to say over five or six years, this figure is almost constantly exceeded. Thus, in Edinburgh during the five-year period, 1920-1924, 16,249 cows passed through the abattoirs and, of these, 7,277 or 44.78 per cent. were shown to be affected with tuberculosis.

Tuberculous infection of milk is attributable mainly to cows which fall into two categories—namely, (1) those with tuberculous mastitis, and (2) those with acute, actively progressive tuberculosis accompanied by rapid loss of condition. In addition, the emaciated tuberculous cow and a very small number of cows, which, though affected with tuberculosis, show no clinical manifestations of the disease, are known sometimes, but not constantly, to eliminate tubercle bacilli in the milk. It might be said with truth that every tuberculous cow is a potential disseminator of infection, to man through the agency of the milk, but, in fact, the numbers which are actually responsible for human infection by this channel represent a relatively small proportion of the whole.

As to the number of cows affected with tuberculous mastitis, 0.77 per cent. (1 in 142) of the cows slaughtered in Edinburgh abattoirs during the five-year period, 1920-1924, showed macroscopically recognisable lesions. This percentage has varied within very narrow limits from year to year and, as it represents the result of the post-mortem examination of the udder of 16,249 cows, it may be accepted as a fairly accurate indication of the prevalence of tuberculous mastitis. In passing, it is perhaps desirable to state that tuberculous mastitis should not be regarded as necessarily constituting evidence of fairly advanced tuberculosis or of tuberculosis which has become generalised by blood stream infection or otherwise. Our experience in Edinburgh slaughter-house is to the effect that tuberculosis is generalised in 48.2 per cent. of the cows affected with tuberculous mastitis. In the balance of approximately one half, evidence of blood stream infection is absent and the disease is localised in character. Indeed, it is not uncommon to find a tuberculous mastitis in association with a very limited distribution of tuberculosis in the carcass and viscera.

It is quite possible that a sense of alarm, which would not be justified, might be created if the figures were quoted showing the number of cows totally condemned on account of generalised tuberculosis, i.e., tuberculosis in which post-mortem disclosed evidence of blood stream infections or in which, in the absence of blood stream infection, the disease was widely distributed throughout the carcass and viscera. Our slaughter-house records do not differentiate sufficiently between the different types of case which led to total condemnation, to permit selection of those animals in which danger through the agency of milk arose, and those in which it did not occur, or was at least highly improbable. If, however, one might venture, without undue indiscretion, to make an estimate, based on one's personal experience, of the number of dangerous cows, including those affected with tuberculosis of the udder, it would seem probable that the number falls somewhere between 1 and 2 per cent.

From the public health point of view, it is more important to realise that the distribution of the dangerous cows is by no means uniform. Concentrated infection and frequently recurring infection are well known in relation to supplies drawn from herds in which the disease is very prevalent. It would be easy to quote specific instances in illustration of this statement. Further, it cannot be assumed that, because a supply is drawn from a large herd, infection, if it occurs in the milk, will be so diluted by admixture with non-infected milk as to be almost negligible in its effects. It is not a universal practice to bulk the milk from a whole herd. On the contrary, it is quite common to find with a large herd that the milk in any individual container as prepared for distribution is representative of, at most, half a dozen cows. So that the position in regard to infection is frequently the same whether the herd be large or small.

In any campaign directed against bovine tuberculosis attention must, in the first instance, be concentrated on those animals which are a source of human infection. The Tuberculosis Order of the Ministry of Agriculture which has been promised to become operative coincidently with the Milk and Dairies Acts on the 1st September of the current year, will, without doubt, resemble its predecessor of 1914 in that it will confer power to control the movement and to ensure the slaughter of such animals. It should, however, be clearly recognised that the Tuberculosis Orders of 1913 and 1914 were in reality public health measures and were not primarily intended to control or to eradicate bovine tuberculosis. Unless the new Tuberculosis Order is more ambitious than its predecessors, which seems unlikely, it will certainly not eradicate bovine tuberculosis, nor can it be expected to reduce the incidence of the disease to any material extent. It will only contribute to the latter result in so far as it ensures the removal and destruction of those animals which are most active distributors of the seeds of infection amongst their fellows. The number of animals found to fall within the scope of the Order will, no doubt, be greatest in the first few years of its operation, but it will not prevent a recurring, though perhaps smaller, crop of these animals year after year. It must, however, be acknowledged that a Tuberculosis Order on the lines of that operating in 1914 represents a first and essential step in any scheme for the control of bovine tuberculosis.

The Milk and Dairies Acts provide, inter alia, for regular periodical clinical inspection of dairy cattle. In addition, the Scottish Act requires notification to the local authority by the cowkeeper of any cow in his possession which is suffering from any disease liable to infect or contaminate the milk, or any cow which, to his knowledge, is giving tuberculous milk. Provided, therefore, that the Acts are uniformly administered, particularly in the rural areas, the machinery for the early detection and recognition of the dangerous tuberculous cow, and for her effective and permanent removal from dairy stock under the Tuberculosis Order, will become operative in September, and a move forward of very material value in the interests of public health will have been made.

Whilst the Acts and the Order will, it may be reasonably be expected, go a long way to minimise the danger of tuberculous infection from milk, they will not wholly remove it. Further, they leave the economic side of the tuberculosis problem almost untouched. They, nevertheless, represent as much as could reasonably be undertaken as a first step in legislation on the subject. Both for economic and public health reasons the ultimate aim should be the complete eradication of tuberculosis from dairy stock, but before any material progress can be made in this respect the interest of stockowners must be awakened and their co-operation secured. The Milk (Special Designations) Orders and the long overdue official recognition which they have given to milk which is the produce of tubercle-free herds, have proved a stimulus in the right direction and, in addition, the public demand for such milk, which is the direct sequel of the Orders, has contributed to a definite, if slowly growing, movement amongst stockowners towards the complete eradication of tuberculosis from individual herds.

In the United States of America the movement in this direction is widespread and it is worthy of note that it was initiated at the instigation of a committee composed of breeders and members of the Livestock Sanitary Association. This committee, in 1918, passed resolutions for the purpose of accrediting herds which were tuberculosis-free, that is to say, herds in which no animal affected with tuberculosis had been found upon two annual or three semi-annual tests with tuberculin by the subcutaneous or other approved method and by a thorough physical examination. Some little time after the movement was initiated, the Purebred Breeders' Association demanded that in accredited herd work the test should be of an official nature and should be made by a veterinary officer of the Bureau of Animal Industry or a regularly employed State veterinarian, and the work of tuberculosis eradication has since then been carried out by the bureau in co-operation with the various States. In December, 1923, five years after the initiation of the movement, the official summary of the work, issued by the bureau showed a total of 35,895 accredited herds comprising 758,376 head of cattle, and 422,648 herds comprising 3,690,080 cattle "once tested free." The progress made in the short period is thus both remarkable and rapid, but the real weight of the movement behind the work of tuberculosis eradication in the U.S.A. is even more strikingly illustrated by the figures showing the total number of herds under supervision. The official statement shows that as at December, 1923, 580,986 herds comprising 5,909,377 cattle were under official supervision in connection with the work of tuberculosis eradication, and in addition there was a waiting list of 201,379 herds containing 2,170,247 cattle.

In Canada, a similar movement, under Government control and direction, is on foot in selected and restricted areas, and considerable progress has been recorded. But in Great Britain, neither the States nor the Canadian procedure is practicable at the present time, and if the problem of eradication is to be tackled, it must be approached more gradually. I do not propose to enter into a discussion of the methods by which the problem may be approached. This, in itself, would provide ample material for a separate paper and discussion. I would, however, make reference to a procedure recently put into experimental operation somewhat widely in this country.

In 1920, Calmette and Guerin described a method of vaccinating calves and young stock against tuberculosis which gives promise of very material aid in the solution of the tuberculosis problem. The procedure consists in the inoculation of calves within a short time of birth with living cultures of tubercle bacilli, the virulence of which has been reduced as the result of prolonged subculturing on media containing bile and glycerine. In the original experiments, vaccinated calves were housed over a period of thirty-four months with clinically tuberculous cows under conditions which favoured natural infection. The experiments clearly proved that the vaccinated calves acquired a high degree of immunity against infection. The vaccine is now available in this country, subject to conditions which will permit of test as to its practical value under farm conditions. Necessarily some time must elapse before this can be determined, but it can, with all confidence, be said that the vaccine offers greater possibilities of general applicability than any of its predecessors.

THE PROBLEMS OF THE MOTORIST.

THE TRANSMISSION SYSTEM.

The petrol engine, unlike the steam engine, has, what is known by engineers, as, a ''constant torque'' characteristic. That is to say, the petrol engine exerts the same twisting force on the crankshaft at all speeds of the engine. This statement is not exactly correct, for, as everyone is aware, there is a limit to the petrol engine's speed and, therefore, at very high speeds the torque exerted decreases. The same applies at very low speeds when the engine begins to ''stall.'' However, within the working speeds at which the engine is driven the torque exerted is practically constant. The power of the engine is proportional to the product of the torque and speed. It is thus seen that the maximum amount of power is developed at high speeds.

It is unfortunate that the petrol engine will not develop any torque without the engine running. This feature makes a clutch on the transmission imperative; for some device has to be used to cause the running engine to take up the driving of the standing transmission system without a sudden jar.

Clutches are invariably some sort of friction device, one face of which is attached to the engine and the other face is attached to a transmission shaft. The clutch pedal is arranged to allow the two faces to come together slowly and the transmission shaft should be brought up to engine speed steadily without any signs of snatching or jerking. Thus the clutch is primarily required because the engine is incapable of starting from rest while loaded.

The fact that the clutch is also necessary in gear changing is only secondary, for there are many skilled drivers that can gear-change successfully without using the clutch. However, no driver can start his car successfully without the use of the clutch.

The next essential portion of the transmission system is the gear box. Many motorists fail to comprehend fully the necessity for gears and are prone to condemn the car that requires the common use of gears and cannot be driven everywhere in ''top.''

It is the constant-torque characteristic of the engine referred to that makes the gear box necessary to the car.

The amount of twisting force or torque required on the back wheels of the car varies considerably. It is easy to imagine that the twisting force required on the wheels to keep the car moving on a level road is much less than that required to start the car on a very steep hill. Yet the engine exerts a constant amount of twisting force. For this reason the gear box is introduced to make it possible to vary the torque on the back wheels, although the torque exerted by the engine is constant.

Three forward gears are the practice in almost all American cars and in many of the European cars. The more expensive European cars, however, usually fit four forward gears.

In the three-geared cars, the various gears are usually known as ''low,'' ''second,'' and ''top.'' When low gear is in use the engine makes the maximum number of revolutions for one revolution of the driving wheels.

When second gear is engaged, the engine makes a lesser number of revolutions than in low for one revolution of the driving wheel.

When top gear is engaged the engine makes a minimum number of revolutions for each revolution of the wheels.

As an example, low gear might mean fifteen revolutions, second, ten revolutions, and top, five revolutions of the engine for each revolution of the driving wheels.

It is thus seen that in low gear the engine has the greatest leverage on the wheels and it is, therefore, the best gear for starting or for climbing very steep grades. At the same time (taking the quoted gear ratios), the engine must revolve three times as fast for any speed as in top gear. This means that the engine will be racing at a road speed of 20 miles an hour, although at the same engine speed in ''top'' the car would do 60 miles an hour.

The maximum torque on the wheels available in top gear is only a fraction of that available in low (in the case quoted, one third), but the car speed is greatest in proportion to the engine speed. Top gear should therefore be used wherever practicable, that is, on level roads or reasonable inclines. Second gear is, of course, an intermediate gear between top and low and should be used wherever the grades suit it.

Many drivers fail to make the best use of their second gear, both in starting and also when hill climbing. The common mistake when starting is to change out of second into top before the car has any way on. The best practice is not to change into top until the car has reached a speed of about 15 miles an hour.

When hill climbing, the driver should not keep in top until the engine has almost stalled, and is labouring heavily; second gear should be engaged when the car has slowed to about 15 miles an hour. In this way the engine is never strained by being allowed to jerk along very slowly with a full throttle.

Another objection to allowing the car to slow right down before changing is that by the time second gear is engaged the car has practically stopped, and probably will not pick up speed in second and so the engine is ''stalled.''

Many drivers hesitate to change down because they are frightened to attempt gear changing at a reasonable speed. There is no reason for this fear, as a good change can be made as easily at 15 or 20 miles an hour as at a lower speed. The only difference is that some drivers have not had the necessary practice at changing down when the car is moving rapidly.

In the case of cars with four gears the change down from top to third on a hill should always be made before the car loses speed, otherwise the car will fail to pull in third, and another change will be necessary.

It is good practice on a four-geared car to change from top at about 20 miles an hour when hill climbing.—''Radiator,'' in the ''Farmer and Settler.''

THE EMPIRE MARKETING BOARD.

The Empire Marketing Board was set up by the Government at the suggestion of the Imperial Economic Committee. It has for chairman the Secretary of State for Dominion Affairs. His predecessor in office is also a member of the Board. Representatives of the self-governing Dominions, of the Colonies, and of home producers and consumers share with them a task of large Imperial significance.

As a body detached from party politics, but intimately aware of the economic needs of the Empire, whether at its heart or at its outermost fringes, the Board has the task of recommending grants from a fund provided yearly for the purpose by the Imperial Parliament.

The Board's policy is to stimulate the consumption within the United Kingdom of Empire products, whether grown at home or brought from overseas.

To this end it aids in improving the quality of Imperial produce, by encouraging research into problems of cultivation, of resistance to the ravages of plant and animal disease, of grading and packing, of transport and marketing.

It invites every Australian to help forward this vital Empire movement by buying the produce of their kinsmen at home and overseas in preference to foreign produce.

Already, on British markets, the influence of the Board has been made manifest, and much interest in Australian products has been stimulated by its well-directed and far-sighted activities.

"The Stallions Registration Act of 1923."

LIST OF REGISTERED STALLIONS.

LIST OF BLOOD STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Admetus	H. J. Kime	Ascot
Ahab II.	A. Sparkes, Ltd.	Brisbane
All Gold	B. Gately	Gresham Hotel, Brisbane
Amberdown	T. Jennings	Greenmount
Applegarth	W. J. Watson	View Field, Clarendon
Ayr Bridge	W. J. Lawlor	Derby Estate, Enoggera
Ayrport	B. Smith	Woolooga
Bachelor's Persse	W. Glasson	Manapouri, Nobby
Battlebridge	R. A. Howell	Killarney
Bebbington Boy	J. O. Mareland	Cinnabar
Ben Riff	J. Stebbins	Wiethew, Wallaville Line
Black Friar	H. Adams	care of V. Bergstrom, Stevenson street. Ascot
Black Leaf	A. G. F. Munro	Goodar, Goondiwindi
Black Prince	P. Portly	North Ipswich
Blue Star	J. B. Nutting	Normanby
Bonnie Ardon	C. Bassingthwaighte	Jandowae
Bonnie Hatan	M. Livingstone	West Talgai
Boomara	P. J. Bishop	Cooyar
Borrosong	E. G. Blume	Ascot
British Born	R. Armstrong	Laura street, Windsor
British Dan	J. Millis	Nanango
Cagou	Flemmich and Davey	Ghinghindi
Calm Laddie	P. J. Frawley	Alma street, Clayfield
Captain Hardie	W. A. Bauer	Mount Sylvia, Gatton
Chantlezore	C. A. McCallum	Two-Mile, Nanango
Charlotte Russe	G. R. Watson	Welford, Nangwee
Clydeside	M. Livingstone	West Talgai, Clifton
Cock of the Heath	J. S. Mylett	Josephville
Coin Nut	D. J. Kerr	Riverton street, Clayfield
Collarette	J. Doyle	Windorah
Cymric	S. McCracken	Bundaberg
Dark Bread	C. Barry	Cecil Plains
Destruction	Scrymgeour, Ltd.	Callandoon, Goondiwindi
Deween	T. Wilson	Steeley street, Ascot
Donore	F. Jurg	Cecil Plains
Don Scorn	J. Grieve	Glenhowden Estate
Duncliff	J. F. Johnson	Currajong, Gin Gin
Earl Haig	H. W. Dight	Long Lagoon
Electric Lad	C. F. Schmid	Kandanga, Gympie
Euclid	A. H. Braithwaite	Murgon
Eudor-cast	J. Cagnacci	Mudgeeraba
Eudorus	S. A. Taylor	Bon Accord, Dalby
Euroa	F. Jurgs	Cecil Plains

Blood Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Fairy Bob	E. G. Blume	Ascot
Far Nicer	M. Livingstone	West Talgai
Fayal	M. W. Barton	Cambooya
Flaxen	F. Farrelly	Degilbo
Flaxwood	W. J. Proctor	Mount Perry
Foot Guard	F. Garmeister	Upper Tent Hill, Gatton
For My Lady	T. A. Clapperton	Tarong, *via* Nanango
Frasca	G. F. W. Goodrich	Waroo
Fugit	E. G. Blume	Ascot
Gallipoli	Cockerill	Glenrock, Kingaroy
Goard	S. A. Taylor	Bon Accord, Dalby
Go Hard	S. A. Taylor	Bon Accord, Dalby
Gold Tie	Collins Bros.	Mount Surprise, *via* Cairns
Goya King	Les. Cook	Greenmount
Guinea Ribbon	Fred Langford	Goondiwindi
Halberd	Lord and Sons	Eskdale, Esk
Halmond	W. H. Hayes	Mount Stanley, Linville
Harry Brandt	G. M. D. Mundell	Red Marley, Condamine
Herobrook	Mrs. Mary Moore	Myall Park, Miles
Highfield	J. H. S. Barnes	Canning Downs
Hindoo Star	W. Bagaley	Warwick
Home Rule	J. E. Grout	Musket Flat, *via* Maryborough
Honda	R. E. and E. O. Frey	Inglewood
Hopoast	R. Birchley	Eidsvold
Iggaree	A. E. Jones	Euroba, Eidsvold
In Trouble	J. E. Shailer	Ascot
Itinerant	H. E. Meddleton	Dumaresq
Jemedah	Mr. Kent	Nulgilday, Eidsvold
Kamos	A. H. Watson	South Killarney
Kenilworth Lad	W. L. Downes	Bell
Kentish Fire	Gus Rienke	Rosewood
Kerman	Arnold Weinholt	Wash Pool, Kalbar
Kewi King	T. B. Foster	Rockhampton
King Apple	J. Douglas	Windsor
King Halberd	J. Schubel	Purga
King-o'Malt	J. Kennedy	Kilcoy
Koatanui	W. H. Thrupp	Roma
Ladomond	W. Backhouse	Killarney
Laddo	Thos. Dingle	Drummer's Creek, Mt. Perry Line
Larceo	W. Hallett	Pony Hills
Leverrier	E. L. Ramsey	Umbiram
Lincome	E. K. McCord	Coonambula
Lodi	J. Murray and Sons	Ilfracombe
Lord Ambrose	S. A. Taylor	Bon Accord, Dalby
Lord Burnside	S. A. Taylor	Bon Accord, Dalby
Lord Haco	Bell Bros.	Kinnoul
Lord Highfield	W. Prosser	Spring street, Hendra
Lord Lyndhurst	Fred. H. Cockerill	Glenrock, Kingaroy
Lord Senyam	P. J. Mayne	Warwick
Loyal Shepherd	E. G. Blume	Lancaster road, Hamilton
Maloola	J. P. Ryan	Gympie
Marcoda	B. Welsh	Wagga Wagga, New South Wales
Master Loch	W. T. Hodgson	The Retreat, Yeulba
Master Orcus	C. A. McCallum	Nanango
Matouree	L. Wedemeyer	Eidsvold
McIlwraith	T. A. Clapperton	Tarong, *via* Nanango
Midad	W. L. Rowling	Toolburra

Blood Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Midnight Frolic	J. B. Shannon	Oxford Downs, Nebo
Mikado	H. J. Franki	Meringandan
Modesto	C. J. Swinburne	Toolburra
Nardini	W. C. McNaughton	Yandilla
Night Flyer	Treweecke and Sons	Umbercollie
Noble	Alf. Falls	Hedley Hill
Nonsuch Laddie	C. Flannery	North Branch
Oliver Twist	G. W. Morgan	Longview Farm, Childers
Orient Mail	J. T. Shannon	care of V. Bergstrom, Ascot
Our Day	S. Smith	Toowoomba
Our Fox	J. W. Archer	Kilcoy
Paddington	H. J. Winten	Rosalie
Paree	T. McGarrigal	Laidley
Patrick Bourne	H. C. Sherriffs	Chinchilla
Petalaster	M. J. Mylett	Linville
Plain Doone	H. McKenzie and R. Kelly	Hamilton
Polybius	M. Yore	Logan Village
Polycraft	M. Ryan	Kialla Stud, Greenmount
Prime Boy	R. M. Bell and Co.	Eskdale South, Esk
Rambler	H. E. Middleton	Dumaresq, Texas
Rappel King	W. McDonnell	Deuchar
Rifle Ross	S. A. Taylor	Bon Accord, Dalby
Rivoli	J. H. S. Barnes	Canning Downs, Warwick
Robin	Jas. Williams	Yagabarni
Ross Gun	S. A. Taylor	Bon Accord, Dalby
Roulette	F. Mason	Palen Creek, Rathdowney
Royal Right	W. M. Philp	Toowoomba
Roychester	D. Stark	Anduramba, Crow's Nest
Salopian	Duncan Bros.	Isis
Scotland Yet	F. J. Armstorng	Pilton road, Clifton
Seige Moi	J. C. Doeblin	Yatala
Seremond	McDougall Estate	Lyndhurst, Warwick
Shell Shock	S. A. Taylor	Bon Accord, Dalby
Silastre	B. Newman	Ayr
Sir Danaus	D. Murray	Drillham
Sir Rino	S. Mylett, Junr.	Beaudesert
Soldier's March	H. Pownall	Stockwell, Builyan
Spring Boy	P. G. Hallam	Eidsvold
St. Atty	Chas. D. Persse	Tabragalba
St. Eiffel	D. Cullen	Pampas
Thalassa	W. Goodrich	Waroo
Tinspear	Arnold Wienholt	Wash Pool, Kalbar
Tom Bernie	R. Betts	Boonah
Town Crier	John Leahy	Valeview, Kinbombi
Underarm	Dunne Bros.	Deception Bay, Burpengary
U.N.I.	J. B. Shannon	Oxford Downs, Nebo
Varicose	T. Dunn	Silvavale, Kingaroy
Veresdale	W. M. Elliott	Veresdale
Walker's Lad	T. Symonds	Mackay
Warsaw	E. R. Barry	Jandowae
Warwick Gun	T. Jennings	Greenmount
White Monk	W. H. Gibley	Dalby
Winsome Prince	F. Nelson	Guluguba
Yellburn	J. S. Williams	Spring Creek

LIST OF BLOOD STALLIONS CERTIFICATED FOR LIFE IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Acrobat	Wm. H. Bell	Strathdee, Mackay
Alorse	Baker Bros.	Maltford, Capella
Baldpate	Coreena Pastoral Co.	Barcaldine
Beechmont	W. C. Geddes	Balmoral
Ben Thor	Martin T. Burke	Springsure
Benzine	M. L. McLaughlin	Burnside, Springsure
Betrayer	T. B. Stanners	Selina, Q.C.R.
Bit-by-Bit	Edward Hannan	Aberdeen, Savannah, Mackay
Black Jack	C. W. Ney	Nebo
Blarney	J. E. Ball	Ubobo, Many Peaks
Boko	J. B. Shannan	Oxford Downs, Nebo
Borghese	Mrs. E. T. Thomson	Coboolima, Calliope
Bondsgun	C. Bauman	Tryphinia View, Duaringa
Brown Danube	D. Blain	P.O., Yeppoon
Brisbane	Police Breeding Station	Rewan
Butler	Archibald McPacey	Merimal
Bobzard	N. E. Perry	Braeside, Nebo
Callaissand	J. B. Shannon and Co.	Nebo
Calid	Peak Downs Pastoral Co.	Capella
Capell	A. E. Rideout	Ballie Farm, Mount Larcom
Captain Night	J. O'Sullivan	Glencoe, Many Peaks
Cardigan	T. P. Hausler	Clermont
Certies	John Dalrymple	Nebo
Coat of Mail	Mackenzie, Ltd.	Tooloomba, Styx
Cornshine	L. L. Johnston	Mira, Comet
Cruzot	T. B. Starkey	Rainworth, Springsure
Deerborough	M. Ryan	Arcturus Station, Springsure
Delator	C. W. Wickbold	Lake Learmouth
De Lyosa	Mackenzie Bros.	Coolarah, Alton Downs
Dighton	Cudmore and Sons	Tara Station, Saltern
Dooloogra	Wallis and Co.	Mount Spencer, *via* Eton
Early Star	Mackay and Co.	Huntly
Eman	John Fenlon	North Rockhampton
Ercanil	Police Breeding Station	Rewan
Faithful Laddie	R. G. Talbot	Ripple Brook, St. Lawrence
Fearless	H. J. Friend	Springwood, Springsure
Flavian	Mackenzie, Ltd.	Tooloomba, Styx
Flavic	Mackay and Co.	Huntly Station, Claremont
Gozardo	R. J. McClure	Mackay
Gricka	C. W. Wright	Waverley Station, St. Lawrence
Gringalet	Mackenzie, Ltd.	Tooloomba, St. Lawrence
Henorite	L. S. Richards	Mount Hillalong, Nebo
Hillapine	James Breen	Yukan, Sarina
Itys	Henry Beak and Sons	Broadmeadow, Nankin Junction
Jack Lad	F. Fox	Killarney, St. Lawrence
Jewel Lad	A. E. Rankin	Bimbie, Duaringa
Kenoskye	W. Rownall	Many Peaks
Kerwaka	Bigge and McConnel	Consuelo, Springsure
Land Gem	J. W. Mylrea	Mona Vale
Last Call	Catherine Bauman	Tryphinia
Libertine	Police Breeding Station	Rewan

Blood Stallions Certificated for Life in the Central District—continued.

Stallion.	Owner.	Address of Owner.
Lockmayne	Cook and Cook	Green Mound, Pleystowe
Lord Ayr	Sarah Carington	Comet
Lord Davill	George Daniels	Gindie
Lord Elderslie	Police Breeding Station	Rowan
Maltbush	John Shannan	Saltbush, St. Lawrence
Marmion	John Shannan	Saltbush, St. Lawrence
Master Borgese	Geo. Lanivan	Banana
Master Togo	R. J. Mylne	Gladstone
Master Trumpcorn	Andrew Jackson	Basalt Creek, Rolleston
Medal	E. D. Wells	Rolleston
Mountain Lad	Gilchrist, Watt, and Cunningham	Glen Prairie, Marlborough
Orphan	P. Keune	Priora, Clermont
Parthleigh	Frank Fox	Killarney, St. Lawrence
Poseur	J. Arthur	Braeside, Barcaldine
Publican	J. Clarke	Barcaldine Downs, Barcaldine
Rightaway	H. G. F. Schneider	Mount View, St. Lawrence
Robin Hood	Winter, Irving, and Ailson	Springsure
Roseacre	Wilson and McDouall, Ltd.	Calliope
Siege Artillery	A. Crowther Williams	Homevale, Nebo
Silver Ford	H. C. S. Griffin	Wolfang, Clermont
Sir Sefton	Collaroy Pastoral Co.	Collaroy
Smart Laddie	Dunne and Sons	Wooroona, Duaringa
Spearman	Bleak Pastoral Co.	Gladstone
Steel Cover	Anderson	Mirani, Mackay
St. Elmo	J. F. Rush	Koumala
St. Nivas	McLaughlin, Ltd.	Raby Creek, Duaringa
Sunny Side	Arthur Beak	Wallangie, St. Lawrence
Sweet Fox	R. Logan, care of H. V. Hinton	Rockhampton
Timolean	Australian Mercantile Land and Finance Co.	Rebio, Capella
Tweady King	W. J. Becker	Taroom
Turkish Lad	Police Breeding Station	Rowan
Windsor	Mrs. E. T. Thomson	Bocoolina, Calliope
Wolowa	P. Comiskey	Withersfield
Yaambin	T. Salmond	Laglan, Claremont
Young Flavian	Mackenzie, Ltd.	Tooloomba, Styx
—— (unnamed)	Staff Bros.	Woodstock, Marlborough
—— (unnamed)	Thos. Symonds	Oakdale, *via* Eton

LIST OF BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Ardglen	W. J. Munro	Southport
Bell's Folly	R. Bell	Jubilee Hotel, Leichhardt street, Brisbane
Black Joke	E. L. Ramsay	Umbiram
Bright Grain	J. Kelly	Russell street, Toowoomba
Cheviotdale	T. M. Ahern	Gresham Hotel, Brisbane
Count Gervase	J. T. Joyce	Brisbane
Craftdancer	P. Scully	care of T. Wall, Booval
Dal	C. F. Maitland	Biggenden
Glenoban	M. Livingston	West Talgai
Halberk	Mrs. Angel	Murgon
Kilo	A. G. Robinson	Eidsvold
Laddie Boy	T. Carroll	Sandgate road, Albion
Lord Lebius	A. Hunter	Nanango
Lord Redfern	H. Shirlaw	Augathella
Marshall Field	W. J. Noud	Clayfield
Mathover	E. P. Itztein	Degilbo
Olive Steel	J. F. O'Sullivan	Wallaville, Gin Gin
Palevan	E. L. Ramsay	Umbiram
Pat Doonan	F. Jurg	Cecil Plains
Persse's Double	W. J. Noud	Kent street, Hamilton
Prince Kerman	C. L. R. Nye	Buderim Mountain, N.C.L.
Romany Love	W. C. Byrne	Gordon street, Hendra
Sir Lovelace	Roy Palmer	Eureka, Childers
Tabragalba	J. Clark	Union Bank Chambers, Queen street, City
The Swan	A. G. F. Munro	Goodar, Goondiwindi
Toe	J. H. S. Barnes	Warwick

LIST OF BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Marcus Highfield	Wilson and McDouall	Calliope Station
Midnight	Galloway Plains Pastoral Co.	Gladstone
The Grouse	J. Bryns	Bookmaker, Rockhampton
Utaire	W. C. Miller	Coreena, Barcaldine
—— (unnamed)	Gilchrist, Watt, and Cunningham	Glen Prairie, Marlborough

LIST OF BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1926-27 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Cornmore	J. Y. Shannon	care of M. Bergstrom
Chantross	W. Loughlin	Milmerran
Chryscup	W. K. Bushell	Edmond street, Newstead
Lauderdale	I. J. Moore	Ascot
Lord Demon	C. Caswell	Brisbane
Piastoon	R. H. Edkins	Bimbah, Longreach
Reamer	G. E. Atthow	Brisbane
Royal Dignity	L. V. Nicol	London road, Clayfield
Smithfield	D. A. Winton	Smithfield, Toowoomba
The Dragon	E. J. Dickson	Hill End, South Brisbane
Wee Glen	P. J. Frawley	Alma street, Clayfield
Zohob	I. Freedman	New Farm, Brisbane

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Admiral Beatty	J. A. McRae	Raeburn, Crow's Nest
Admiral II.	C. A. Dunenann	Highfields
Bally	C. Knack	Broadmere
Baron Bold	F. M. Heineman	Eulo, *via* Cunnamulla
Baron Carlyle	Jondaryan Estates	Jondaryan
Baron Kelvie	Jas. Tobin	Currajong Creek, Gin Gin
Baron Swanson	E. A. Ensor	Ascot, Bell
Billy	F. G. Armstrong	Clifton
Billy	E. Carroll	Jandowae
Billy	C. H. Morris	Wattle Glen, Pratten
Black Dight	A. G. F. Munro	Goodar, Goondiwindi
Blaze	W. Backhouse	Killarney
Bold Wyllie	Department of Agriculture and Stock	Brisbane
Bonnie	T. Embrey	Kingaroy
Boonah	S. Venall	Mutdapilly
Boro Wigton	G. R. Watson	Nangwee
Brave Boy	E. Ziebarth	Blenheim, Laidley
Brigadier	J. G. Rattey	Fairy Mount, Jandowae
Bright Star	J. J. Doyle	Northcote street, East Brisba
British Abbott	Jas. Barbour	Glen Ken, Esk
British Hope	W. Frood	Winterdyne, Pittsworth
British Victory	McCullogh Bros.	Milmerran
Broken Blaze	G. Watson	Oak Park
Bunya Baron	Reiss Bros.	Goombungee
Bute Bawnet	Gross Bros.	Campbell Plains
Capt. Clyde	Lavender and Co.	Richlands, Meringandan
Capt. Dale	A. T. Creswick	St. Helen's
Carlyle Crystal	A. Langmore	Prairie, Jondaryan
Carlyle Yet	E. B. A. Armstrong	Mywybilla, Oakey
Crown Royal	J. B. Edwards	Kingaroy
Crystal	J. Dalton	Spring Creek
Crystal Blaze	Mrs. A. F. Watson	Yarranlea
Darwin II.	J. P. Walsh	Mount Perry
Doctor Graham	E. G. Payne	Brooinia road, Chinchilla
Donald Crystal	L. Wedemeyer	Eidsvold
Donald's Pride	F. W. Abraham	Lark Hill, Walloon
Drumshambo	M. J. Nolan	Crossdale, Esk
Duke	J. P. Fleming	Texas
Earl Carlyle	J. H. Fairfax	Cambooya
Fearnaught	W. Deacon	Allora
General	F. B. Kerle	Mount Tarampa, Coominya
General Wallace	Department of Agriculture and Stock	Brisbane
Glenalla	Department of Agriculture and Stock	Brisbane
Glencairn	W. P. Casey	Milbong
Glenfern	W. R. Sahiff	Kilkivan
Glylad	R. P. Lepp	Greenmount
Grandmaster	W. J. Grayson and Son	Killarney
King	A. Hunter	Nanango
King	Bindango Pastoral Co.	Bindango
King Borah	D. McGregor	Craig, Royston, Milmerran
King's Council	Shine Bros.	Fernvale
Knight	A. J. Specht	Tahara, Wellcamp

Draught Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Lion	W. T. Hodgson	The Retreat, Yeulba
Links	Turner and Munro	Wyaga
Lord McIvor	F. B. Cary	Vermont
Lord Wigton	T. Phelan	Gladfield
Mac	A. D. Spence	Kiaora, Wallumbilla
Major	Thos. Hanney	Bunya road, Dalby
My Pride	J. McGahan	Yangan
Percy	H. Cadel	Northern road, Roma
Pilot	John Campbell	Laidley
Premier Again	Department of Agriculture and Stock	Brisbane
Premier's Fancy	W. J. Borchert	Murgon
Pride of Invermay	H. Retschlag	Bonney View, Rathdowney
Pride of the Valley	O. F. Zischke	Glen Grove, Forest Hill
Prince	E. W. Genrich	Cooyar
Prince George	D. Carrol	Kingaroy
Prince George II.	A. C. Krieg	Brookstead
Prince Invermay	J. Fogarty	Avon Vale, Clifton
Prince Percy	A. Cooper	Burrambilla
Prospector	Department of Agriculture and Stock	Brisbane
Punch	W. E. Houston	Blackbutt
Robin	J. Kelly	Mount Sturt
Robin	J. W. Retter	Mount Tyson, Oakey
Rory Prince	M. S. Bishop	Glengowrie, Cooyar
Royal Hope	Thos. Telford	Springvale, Clifton
Royal Salute	M. J. Mylett	Linville
Royal Shepherd	E. Hess	Maclagan, Jondaryan
Shepherd's Pride	R. T. Jones	Toowoomba
Silver Crown	T. Bishop	Rocky Glen, Cooyar
Sir Walter	J. Drinan	Wallaville, *via* Bundaberg
Squaredale	Jas. Sprott	Talgai West, Ellenthorpe
St. George	R. Sippel	Redgate, Murgon
The Admiral	C. Keilor	Maleny
The Intent	Jas. Sprott	Talgai West, Ellenthorpe
Union Jack	A. Winter	Taabinga, Kingaroy
Valley Royal	Guy Watson	Pittsworth
Widgiewa Banker	T. J. Turkington	Pilton, Nobby
Wigton Boy	Ronald McDougall	Cooyar

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR LIFE IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Baldy	Arthur Beak	Willangie, St. Lawrence
Baroona Majesty	Department of Agriculture and Stock	State Farm, Gindie
Birdwood	J. C. Wells	Gothlands, Springsure
Black Prince	Gilchrist, Watt, and Cunningham	Glen Prairie, Marlborough
Bortim	J. B. Shannon	Oxford Downs, Nebo
Brown Lock	David S. Warnock	Mount Pleasant, Malchi, Gracemere
Brown Prince	A. W. Christiansen	Raglan
Brown Ronald	Australian Mercantile Land and Finance Co., Ltd.	Retro
Ced	Baker Bros.	Malthoid, Capella
Clyde	Edmund Jowett	Vergement, Longreach
Cob	Daniel Brand	Three-Mile, Homebush
Conqueror	John Shannon	Saltbush Park, St. Lawrence
Darnley	J. B. Shannon and Co.	Cockenzie
Darnley Again	Beck Pastoral Co.	Gladstone
Duke	A. Hoff	Nagoorin
Duke	Jas. Kersey	Sunnydale, The Caves
Gilbert	F. Myles	Burnum, Many Peaks
Hopewood Pride	J. B. Shannon	Oxford Downs, Nebo
Imperial Knight	A. Hoff	Nagoorin
King Arthur	Department of Agriculture and Stock	State Farm, Gindie
King Harold	J. Brough	Habana
King of the Ring	J. P. Kielbach	Sunnyside, Mackay
King's Council	Wm. Henry Arlette	Mount Convenient, Sarina, Mackay
Kiwi	Thos. McNae	Bryne View, Many Peaks
Loch Lomond	W. Pownall	Dackiel, Many Peaks
Major	W. J. Bennett	Clermont
Marathon	E. J. Brewer	Over Cliff, Sarina
Mark	F. B. Starkey	Rainworth, Springsure
Mick	Alexander Watt	Glenham
Nobel	Thos. C. Seierup	Scrubby Creek, Gracemere, Rockhampton
Operator	Peak Downs Pastoral Co.	Capella
Prince Fearnought	J. C. Rasmussen	Mount Convenient, Sarina
Punch	C. Emery	Bororen
Punch	W. J. Greedy	St. Lawrence
Robin	Ernest John Brewer	Over Cliff, Sarina
Roddy	J. B. Shannon	Oxford Downs, Nebo
Royal	T. Childs	Cania Diggings, Many Peaks
Royal Crown	C. Hanman	Savannah, North Eton
Royal Robert	A. C. Williams	Homevale, Nebo
Royal Simin	Bigge and McConnel	Coronelo, Springsure
Saxon	Fred P. Hickman	Uplands, Bororen
Yaamba	G. E. MacDonald	Dunrobin Park
Young Conqueror	J. B. Shannon	Oxford Downs, Nebo
Young Royal	R. L. James	Rosedale
Young Shannon	Wilson and McDouall, Ltd.	Calliope Station, Calliope
—— (unnamed)	W. J. Bennett	Clermont
—— (unnamed)	A. G. Lawrie	Evergreen, Westwood
—— (unnamed)	J. B. Shannon	Oxford Downs, Nebo
—— (unnamed)	B. Wagner	Marylands, St. Lawrence
—— (unnamed)	H. J. Wagner	Marylands, St. Lawrence
—— (unnamed)	J. J. Campbell	Police Breeding Station, Rewan

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Admiration	J. Breyden	Brooklyn
Baron Sheriff	A. C. B. Bligh	Kurrawah
Barrister	J. B. O. Evans	Allora
Bay Boy	J. Ryan	Yeulba
Bright Dale	Alfred C. Wagner	Boonah
Bright Star	R. Craike	Wildash
British King	Hart Bros.	Clifton
British Laddie	J. H. Funk	Milmerran
British Oak	Jas. Sprott	Talgai West, Ellenthorpe
Campbell Royal	Mrs. A. F. Watson	Oak Park, Yarranlea
Campbell Spot	H. Seiler	Tingoora
Cedric	T. J. Ryan	Maryvale
Colonel Wigton	G. R. Watson	Nangwee
Craigie Willie	W. J. Ridgwell	Apple Tree Creek, Isis
Crystal Comet	Mrs. A. F. Watson	Yarranlea
Doctor	J. J. Baxter	Boxwood, Taroom
Douglas	C. S. Doeblin	Yatala
Duke	J. A. Mossman	Emu Hill, Miriam Vale
Duncan	Lord and Sons	Eskdale, Esk
Excelsior	J. W. Horrobin	Silverdale, Tingoora
General Pride	F. F. Harm	Plainland, Laidley
Glenogle	G. R. Walker, Junr.	Stockyard Creek
Glenore	J. Linnan	Lake Clarendon, Gatton
Hendon Hope	W. T. Birt	Mount View, Miva
Hope III.	Ferrier Bros.	Surat
Hugo	Jas. Sprott	Talgai West, Ellenthorpe
In-the-Boom	W. F. Greenslade	Nanango
Joe	P. Meyer	Reid's Creek
Ken	J. O'Shea	Southbrook
Lance Jack	A. T. Creswick	St. Helen's, Pittsworth
Logio	J. S. Tosh	Cromdale, Warra
Logie Boy	Jas. Kennedy	Kumbia, Kingaroy
Lucky Willie	H. W. Wingfield	Ulmarra, Clarence River, New South Wales
MacGregor	F. P. Alexander	Forest Park, Dalby
Major	C. Grieve	Walloon
Malcolm	M. M. Gordon	Grosvenor Downs, Clermont
Marshall Allenby	Queensland National Pastoral Co.	Brisbane
Marshall Haig	J. Anderson	Pittsworth
Marshall Joffre	J. Johnston	Mackay
McTavish	Scott McLeod	Terricka
Nobby	B. E. Free	Nobby
Pretender	J. Lehmann	Frenchton, Rosewood
Pride of Glen Cairn	E. G. Henderson	Brooyar, Sexton
Prince Charlie	C. A. V. Barber	Rywung
Prince Charlie	G. W. A. Kerr	Kia Ora, Kogan
Professor	M. L. McMillan	Lochinvar, Ayr

Draught Stallions Certificated for the Year 1925-26 in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Prosfield	Queensland Agricultural High School and College	Gatton
Punch	Hunter Bros.	Cinnabar
Rob Roy	G. A. Salisbury	Rathdowney
Royal Cellus	G. Weir	Hatton Vale, Laidley
Royal Crystal	Mrs. A. F. Watson	Oak Park, Yarranlea
Royal George	Fairymead Sugar Co., Ltd.	Bundaberg
Royal Jock	C. Martin	Marburg
Royal Scotch	Mrs. A. F. Watson	Yarranlea
Scotland's General	Jondaryan Estates	Jondaryan
Sir George II.	W. Knack	Summerhill, Laidley
St. George	W. A. Schimke	Summerhill, Laidley
The General	G. R. Watson	Nangwee
Tiger	G. Watson	Pittsworth
Vampire	August Dau	Coleyville
Warwick Lad	State Farm	Hermitage
Young Baron Kelvie	J. Weise	Blenheim
Young Dunrobin	J. Campbell	Haden
Young Prince	F. A. Mitchell	St. Aubyn, Crow's Nest
—— (unnamed)	C. A. Munro	Arcot, Silverspur

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Baron Duke	H. C. S. Griffin	Wolfang, Clermont
Bill Lad	Mackay and Co.	Huntley Station, Clermont
Bostock Lad	John Shannon	Saltbush, St. Lawrence
General Wheeler	A. C. Williams	Homevale, Nebo
Major II.	E. Hannan	Savannah, North Eton
Niger	F. B. Starkey	Rainworth, Springsure
Royal Cellus	M. O'Donohue	Comet Downs, Springsure
Royal Surge	John Shannon	Saltbush, St. Lawrence
Young Lockwood	J. B. Shannon	Cockenzie, Nebo
—— (unnamed)	Arthur Beak	Wollargie, St. Lawrence

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1926-27 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Bright Dale	A. C. Wagner	Boonah
Cedric	T. J. Ryan	Clintonvale, *via* Warwick
Colonel Wigton	G. R. Watson	Nangwee
Corporal Dale	A. G. Creswick	Pittsworth
Glenore	H. Embrey	Tallegalla
Glenshea	W. Frood	Winterdyne, Pittsworth
Lucky Dale	A. G. Creswick	Pittsworth
Major Dale	A. G. Creswick	Pittsworth
Mossdale	F. A. Coxton	Nottinghan Downs, Whitelands
Nobby	B E. Free	Nobby
Pretender	W. C. White and Sons	Bluff Downs, Charters Tower
Royal Cellus	P. McNamee	Benally, New South Wales
Sergt. Dale	A. T. Creswick	St. Helen's, Pittsworth
Wellford	R. A. Yarrow	Kingaroy
Young Rich and Rare	J. W. Sutherland	Inglewood

LIST OF PONY STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Adonis	A. H. Johnson	Perrinuan, Dalby
Auckland	C. Leisemann	Toogoolawah
Black Dick	R. Traisdell	Pinelands, Crow's Nest
Black Mac	C. A. Kanofski	Grandchester
Black Opal	C. M. Smith	Smithfield, Gatton
Black Pastel	H. Arndt	Tallegalla
Black Prince	J. Murray	Bromelton
Blue Rudd	L. R. W. Kennedy	Curtis street, Bundaberg
Bobbin	C. Potter	Hail Street, Petrie Terrace
Bonnie Dien	Geo. Neale	Booie, Nanango
Lord Rex (Bonnie Lad)	H. Cox	Ipswich
Bonny Lad	C. R. Nye	Buderim Mountain
Bonnie Mac	H. Philp	Herries street, Toowoomba
Brownie	J. H. Buhwedel	Murphy's Creek
Byron's Pride	E. A. Mulroney	Mount Alford
Clyorie	J. W. Ross	Goomboorian, *via* Gympie
Cock Robin	J. Grant	Musket Flat
Commandant	V. Farquharson	Bell street, Newtown, Toowoomba
Con	Mrs. Russell	Chinchilla
Cymro	S. Wilson	Newtown, *via* Ipswich
Dan	C. A. Munro	Arcot, Silverspur
Darby	Jas. Gray	Swanfells
Digger	W. C. McLellan	Chinchilla
Digger	E. W. Schultz	Advancetown, Nerang
Dinarth Lad	J. Jackson	care of R. Jackson, Ltd., Eagle street, Brisbane
Dinkum	W. Glasson	Manapouri
Don	S. Hansen	Kingaroy
Don	W. Hugent	Coal Creek, *via* Esk
Dudley	W. J. Cutler	Laidley
Eric	H. S. Young	Spring Creek
Gildus Rufus	A. P. Ward	Rathdowney
Ginger	B. Perry	Everton Park, Kelvin Grove
Golden Jim	H. Hock	Dalby
Golden Sunset	N. Hammant	Memerambi
Gold Dust	W. A. Bauer	Mount Sylvia, Gatton
Gulah	R. A. Howell	Killarney
Gwalia Australia	J. W. Luke	Ballandean
Hafrod Sensation	J. A. Rudd	Department of Agriculture and Stock, Brisbane
Havelock	R. Ashwell	Broxburn
Hector	H. Hickson	Toowoomba
Ivanhoe II.	J. Young	Briggs road, Ipswich
Jackie	Perritt Bros.	Kabunga, Kinbombi
King	E. B. Tribes	Kilcoy
King of the Dandies	F. Thornton	Wamuran, Kilcoy
Kubelick	A. E. Bracker	Edgecombe, Texas
Little Don	Lionel Range	Kogan
Little Fire	J. Corcoran	Beaudesert
Little Rufus	R. Gordon	Yarraman
Logan Bantam	Wm. Waugh	Maidavale, Kainkillenbun
Ludo	E. Pocock	Palmer street, Windsor

Pony Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Magic	J. P. Costello	Ann street, Maryborough
Magpie	J. Thompson	Dalby
Mahaka	J. C. Stockden	Cinnabar
Mahomet	M. E. Galloway	Cootharaba, *via* Gympie
Major Hall II.	A. L. Williams	Wallumbilla
Master Amber	C. R. Gore	Pelican
Master Cookoo	D. H. Perry	Milmerran
McShanis Choice	C. Thompson	Stanthorpe
Medium	S. Jurd	Marella, Stanthorpe
Merry	Stan. Arthur	Keetah, Yelarbon
Merry King	D. Neville	Elphinstone
Mickey	W. O'Neill	Seymour road, Ascot
Mike	Nathan Chicken	Jondaryan
Model Boy	H. G. Loveday	Toowoomba
Pastel of Auchlachan	H. M. Chaille	Blink Bonnie, Esk
Pat	W. Clarris	Palmvale, Taroom
Phoenix II.	N. H. Wieland	Currajong Creek, Tirroan
Plume	Ola Akesen	Taabinga, Kingaroy
Prince Badger	Herbert Sinnamon	Moonbra, Esk
Prince Edward	J. J. Delaney	Isis Central Mill
Prince Fauntleroy	Cecil Roberts	Croxley
Prince Harold	T. E. B. Dingle	Drummer's Creek, Mount Per Line
Roma	Athol Campbell	Woodford
Romp	J. Stiler	Durong, Wondai
Rosco	C. C. Ringlestein	Walloon
Rover	T. C. Huth	Mount Perry
Sandy	D. Smith	Nanango
Signaller	J. V. Coughlan	Combango, Yeulba
Segnit	P. H. Elks	Stanthorpe
Silver Gleam	Hart Bros.	Head Hill
Silver King	John Millins, Junr.	Wheatvale, *via* Warwick
Silver King	Owen Mitchell	Mount Colliery, Tannymorel
Simple Jim	A. Petzlen	Stanthorpe
Spring Bright Laddie	Stewart Bros.	Avonel, Toogoolawah
Sivelshio	W. Bradley	Koondaii, Bell
The Master	E. R. Barry	Jandowae
Thomas	E. R. Roberts	Careena, Kogan
Tibby	E. W. Baxter	Remount Depot, Enoggera
Tim Thumb	H. E. W. Walpole	Warra
Tiny Town	J. Diamond	Burnett street, South Bundaberg
Titmouse	F. Henderson	Camp Hill, Coorparoo
Togo	D. J. Egan	Cooyar
Tom Thumb	Mrs. A. H. Scantlebury	Kurrajong Park, Miles
Toy	O. B. Olsen	Atthow Parade, Nundah, Brisbane
Trusko II.	M. Rynne	Cunningham
Viceroy	P. G. Eaton	Neurum, *via* Kilcoy
Welsh Lad	J. Singleton	Laidley
Welsh Star	C. Burow	Memerambi
Whiskers	Rhondda Colliery, Ltd.	Bundamba
Windermere Meteor	W. H. Scott	Strathpine
Wonder	H. J. B. Hutton	Glen Hutton, Helidon
You'll Do	F. Patrick	Red Hill, Gympie
Young Kim	C. Hohnke	Nanango
Young Lew Llwyd	Stephens and Rudd	Mudgeeraba
Young Romulus	E. J. Reif	Boonah

LIST OF PONY STALLIONS CERTIFICATED FOR LIFE IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
A. C.	N. G. Walker	Fairfield Station, Duaringa
Ace of Hearts	D. Allan, Junr.	St. Lawrence
Ace of Hearts	Richard Brooks	Munindilla, Goowarra
Billy	Una Olive Neil	Red Brae, Bondoola
Bonny Boy	Mrs. E. T. Thomson	Boroolima, Calliope
Dandy's Pride	Bernard J. McGuire	Belmore Hotel, Mackay
Joker	R. Farrelly	Simla, *via* Eton
Micky	Jas. Dwyer	Wandal, Rockhampton
Monty	Thomas Symonds	Oakdale, *via* Eton
Nun Nicer II.	A. Ward	Neura Plains Dairy, Rockhampton
Polo II.	E. Dougall	Miriam Vale
Rocket	G. C. Grovcock	The Grange, Capella
Sandow	Mrs. E. T. Thomson	Boroolima, Calliope
Silver Dick	W. B. Swain	The Range, Eton
Silver Watch	F. S. Creese	North Side, Mackay
Sir Butler	W. Thompson	245 George street, Rockhampton
Tom Thumb	C. Emery	Fairview, Bororen
Welsh Prince	Bernard J. McGuire	Belmore Hotel, Mackay
Whitefoot	H. F. Schneider	West Rockhampton
Zinqume	Donkin Bros.	Meteor Downs, Springsure
——(unnamed)	B. M. Biddle	Clermont

LIST OF PONY STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Badger	H. Redlen	Toogoolawah
Black Jewel	W. R. Pember	Fletcher Siding, Southern Line
Cupid	J. E. Jones	Dalby
Dapple King	R. G. Lowe	Killarney
Donald Dinnie	R. J. Cleary	Greymare
Eclipse	D. A. Affleck	Toolburra
Golden King	J. D. Hamley	Cressby, Jandowae
Hogmanay	E. G. Henderson	Brooyar, Sexton
Ivanhoe II.	J. Young	Cemetery Road, Ipswich
Johnnie	W. Pagel	Lowood
Little Boo	A. Onus	Nanango
Little Jim	Ed. Purnell	Chinchilla
Lord Ivanhoe	A. R. Harker	Peak Crossing
Medanga	G. Lohde	First avenue, Zillmere
Merry Thought	Ed. Wells	Pickanjinnie
Mischief	J. Rice	Moorooka
Opal Prince	E. G. Huxham	Jondaryan
Prince of Orange	B. H. Nicol	Oakey
Red Jim	J. B. Becker	Taroom
Royal Globe	R. F. Newman	corner Hope street and Montague road, South Brisbane
Sammy	Thos. Jarrold	Dalby
Sexon	R. A. O'Brien	Dalby
The Swell	W. J. Lawler	Derby Estate, Enoggera
Wee Jock	D. J. Wyllie	The Glen, Jandowae
Welsh Gleam	Mrs. Beatrice Maxwell	Chatsworth, Gympie
Welsh Lad	J. H. Atherton	Miva
Xmas	T. D. Black	Brigalow

LIST OF PONY STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Kiwi	E. A. O'Connell	Bracewell, Mount Larcom

LIST OF PONY STALLIONS CERTIFICATED FOR THE YEAR 1926-27, IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Archer	R. A. Howell	Killarney
Mischief	W. H. Richings	Upper Paddington, Brisbane
Nabob	R. A. Howell	Killarney

LIST OF TROTTING STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Abbey Dean	W. Smith	Nudgee road, Northgate
Afghan	H. Hayes	Brassall
Bedrock	W. Ballin	Frenchton, Rosewood
Belby	W. Craft	East Bundaberg
B. H. Wilkes	A. J. Tuckett	Rocklea
Billy Wilkes	J. Murphy	James street, New Farm
Billy Wilkes	S. Mahoney	Bundaberg
Blue Globe	W. Thomason	Bundaberg
Carlyle Wilkes	Perrett Bros.	Flinders, Fassifern Line
Childe Harold	J. Gregg	Blacksmith, Red Hill
Colin Bells	G. King	Salisbury road, Ipswich
Direction	C. H. Freeman	Silverleaf, Murgon
Don Car	G. S. Higgs	Ottaba, Esk
Financier	J. Sloss	Kingsthorpe
Harold Bells	W. Stevens	Wilga Park, *via* Warra
Haroldwood	G. Horrocks	Kalbar
Jock Beldon	F. R. Baxter	Morningside
King Bells	J. Dowridge	George street, Brisbane
King Belmont	A. N. Munro	Warwick
Longford	T. Richards	Otahuhu, Auckland, New Zealand
Major Huon	F. J. Frampton	Granville
Marvin Cole	H. H. Dunkley	Blanch View, Helidon
Marvin Cole	Mrs. E. Spreadborough	Rosewood
Merry Patch	F. Wood and A. Dingwall	Warra
Morlus	W. E. Alexander	Gunalda
Onward Silver	Nurse L. Walsh	Earl street, Red Hill
Pronto	G. L. Wilson	Mount Sturt
Ravenwood	A. E. Higgins	Toowoomba
Royal Globe	R. F. Newman	cr. Hope street and Montague road, South Brisbane
Sir Johnston	Mrs. H. E. C. Heath	Kingaroy
Sparkling Echo	L. B. Reese	South Brisbane
Spark	H. E. Betts	Glastonbury road, Gympie
Sparkling Jewel	W. H. Smith	Woodford
Sparkling Sun	Chas. Stephan	Gap View
St. Lucia Lad	J. T. Scrymgeour	Netherby, Warwick
Sonny Prince	B. C. W. Koehler	Yamsion
Sonny Wilkes	Robt. Crooks	Allora
The Joker	J. E. Moore	Pialba
Ukulele	B. R. Ramsey	Gympie
Victor Wilkes	C. W. Free	Clifton

LIST OF TROTTING STALLIONS CERTIFICATED FOR LIFE, IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Cole King	W. M. Beck	Carlyle street, Mackay
Dabreen	A. A. Stime	West Plain Creek, Sarina
Grand Chimes	B. Farrelly and B. J. McGuire	Broadsound road, Mackay
King Billy	M. G. Rahl	Pink Lily, Rockhampton

LIST OF TROTTING STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Boy Cole	W. E. R. Brocklebank	Felton, Greenmount
Concord	W. J. McDonald	Goombungee
J. J.	G. Jeppensen	Kingaroy
Mac Wilkes	H. G. Lohmann	Woodstock street, Maryborough
Prince Cole	W. E. R. Brocklebank	Greenmount
Sparkling Echo	L. B. Reese	Crown street, South Brisbane
Virginian	J. T. Scrymgeour	Warwick
Yankee Dexter	F. E. Willis	Kingaroy
Young Todd	R. Briggs	Annie street, Torwood

LIST OF TROTTING STALLIONS CERTIFICATED FOR THE YEAR 1926-27 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Broadsound	J. W. Hart	Blackbutt
Crown Rex	L. B. Reese	South Brisbane

QUEENSLAND PRODUCTION.

The Registrar-General (Mr. Geo. Porter) has made available the subjoined interesting facts concerning the value of the production of primary and manufacturing industry in Queensland, which will interest readers generally.

During the year ended 30th June, 1926, the total value of production amounted to £63,317,953, as compared with £69,936,043 during the year ended 30th June, 1925.

Rural and Urban Industries.

The production of the several industries during 1925-6 was as follows (1924 5 figures are inserted in parentheses for comparison):—Agriculture, £12,552,936 (£13,992,384); dairying, poultry, and beekeeping, £6,379,904 (£5,964,335); pastoral, £21,117,845 (£26,038,818); mining, £2,174,187 (£2,376,094); forestry, fisheries, and miscellaneous, £2,882,750 (£2,721,360)—the total value of primary production thus amounting to £45,107,622 (£51,092,991). The production of the manufacturing industry (the amount added to the value of raw materials by the process of manufacture) amounted to £18,210,331 (£18,843,052) during the year.

The effects of the dry seasonal conditions obtaining in parts of Queensland are not reflected to any marked extent by the above figures, as same have been computed on 1925 calendar year figures in many cases, and the effects of the drought were not felt during the early portion of that year.

The 1926-27 valuation, which cannot be completed for some time yet, will show more clearly the disastrous effects which the drought has had on the production of the State's industries. These effects were shown to some extent in the trade particulars recently issued by this office.

Production Values.

The following figures show the fluctuations in the value of production during the past five years:—

	£
1921	50,278,000
1922	51,411,000
1923	57,321,000
1924-25	69,936,000
1925-26	63,318,000

In order that the fluctuations in production may be more clearly measured, a further calculation has been made to show how production per capita of the population has varied during the years in question:—

Year.	Production per Capita. £
1921	65.53
1922	65.61
1923	71.15
1924-25	83.77
1925-26	73.52

These figures indicate that there has been, except in the last year, a steady increase in the money value of production from year to year, but a portion of this, by no means inconsiderable, is due to the fluctuations in price levels between the two dates.

Per Capita Output.

A further computation to reduce the money values shown above to a comparative basis has therefore been made and the effect of this is shown below:—

Year.	Production per Capita. £
1921	41.50
1922	37.43
1923	38.46
1924-25	44.56
1925-26	40.04

It might be mentioned that in the above calculation the output per capita in each year was recomputed by means of production prices index numbers, which have been obtained from the Commonwealth Statistician. The values in 1911 have been taken as a base and the figures for the later years adjusted therefrom.

It will be seen from this second table that the fluctuations have been slightly different from those at first apparent.

The Index Numbers.

In order that the relative productive activity may be more readily apparent, index numbers have been computed and appear below. In all cases the year 1911 has been taken as a base 1,000.

Year.	Estimated Value of Production.		Relative Value of Production per head 1911—1000.	Production price Index numbers 1911—1000.	Estimated relative productive activity Index numbers 1911—1000
	Total.	Per head of the population.			
	£	£			
1921 ..	50,278,000	65·53	1,539	1,579	975
1922 ..	51,411,000	65·61	1,541	1,753	879
1923 ..	57,321,000	71·15	1,671	1,850	903
1924–25 ..	69,936,000	83·77	1,967	1,880	1,046
1925–26 ..	63,318,000	73 52	1,726	1,836	940

Attention is drawn to the fact that the values of production shown herein represent the gross output of the several industries and not the return to the producer. Endeavours were made to ascertain this amount by estimating the charges which had to be borne by production, but at this juncture the facts gained are too unreliable to warrant publication.

Retail Prices Index Numbers (August, 1927).

The following retail prices index numbers based on the cost of food and groceries in certain Queensland towns have been made available by the Registrar-General (Mr. Geo. Porter).

The weighted average cost of the same commodities in the six capital cities of the Commonwealth in 1911 has been taken as a base 1,000.

Town	July, 1914.	August, 1926.	July, 1927.	August, 1927.	Percentage Increase from July, 1914, to Aug., 1927.
Brisbane	1,057	1,809	1,640	1,667	57·7
Charters Towers	1,246	2,012	1,999	1,987	59·5
Rockhampton	1,156	1,893	1,764	1,765	52·7
Toowoomba	1,041	1,791	1,566	1,587	52·4
*Townsville	..	2,022	2,004	1,975	..
Warwick	1,083	1 810	1,695	1,719	58·7
Weighted average (5 towns) ..	1,082	1,824	1,659	1,681	55·4

* Not included in weighted average.

It will be noted from the above that there has been, compared with the previous month of July, 1927, an increase of 1.33 per cent. in the cost of the selected list of food and groceries in the five towns as a whole. Compared with the corresponding month of August, 1926, a decrease of 7.84 per cent. is noted.

The actual cost of the regimen of food and groceries for the month of August was highest in Charters Towers and lowest in Toowoomba.

The increased cost in the five towns as a whole since July, 1914, amounted to 55.4 per cent.

The average prices from which the above index numbers have been computed are shown in the accompanying statement.

RETAIL PRICES (FOOD AND GROCERIES) IN SIX QUEENSLAND TOWNS FOR AUGUST, 1927.

Commodity.	Unit of quantity.	Brisbane	Charters Towers.	Rockhampton.	Toowoomba.	Townsville.	Warwick.
		d.	*d.*	*d.*	*d.*	*d.*	*d.*
GROUP I—GROCERIES (Including Bread).							
Bread	2 lb.	5·75	6·50	6·00	6·00	6·13	6 00
Flour	25 lb.	57·20	72 00	64·71	66·43	69 60	67·10
Tea	1 lb.	25·50	29·40	26·57	27·00	27·40	29 40
Coffee	,,	28 87	31·20	30·81	27·43	25·40	27·60
Sugar	,,	4·48	5·25	4·75	4·75	4·80	5·00
Rice	,,	3·40	4·15	3·57	3·93	3·60	4·10
Sago	,,	2·83	4·00	3·07	3·43	3·70	3 90
Jams	,,	7·98	9·70	8·21	8·71	9·05	9 20
Oatmeal	,,	3·98	5·66	4·63	4·60	4·76	4·93
Raisins	,,	10·60	12·60	8·86	9·43	10·20	11·40
Currants	,,	9·15	10·60	9·14	9·29	9 60	10 20
Starch	,,	8·80	12·20	9·71	10·86	10·20	10·80
Blue	dz. sqs.	11·65	17·80	15·14	12·00	17·00	15·80
Candles	1 lb.	10·65	14·60	11·50	10·29	13·40	12·20
Soap	,,	4·56	4·80	4·21	4·79	4·70	5·00
Potatoes	14 lb.	23·60	31·00	23·00	23·00	26·40	24·60
Onions	,,	1·48	2 63	1·57	1·82	2·00	1·70
Kerosene	1 gall.	22·50	26·44	22·56	26·71	22·65	29·20
GROUP II—DAIRY PRODUCTS.							
Milk	1 qrt.	7·65	8·25	7·43	6·57	10 00	7 00
Butter	1 lb.	23·30	26·00	23·86	23·93	25·20	24·00
Cheese	,,	15·10	19·60	15·71	14·86	17·40	17·00
Eggs	1 doz.	19·30	21·00	17·00	14·29	23·25	15·60
Bacon—middle cut	1 lb.	16·30	19·00	17·14	16 29	16·60	17·20
shoulder	,,	10·75	16·40	12·71	11·57	11·20	13·40
Ham	,,	27·29	27·25	26·50	26·00	27·00	26·00
GROUP III—MEAT.							
Beef (fresh)—sirloin	1 lb.	8·30	8·50	8·79	5·86	9 90	7·20
ribs	,,	5·45	6·00	7·00	3 86	6 30	5·30
flank	,,	4·33	4·88	5·30	3·00	6 50	2·80
shin (without bone)	,,	3 40	4·40	4·00	2·43	4·30	2·38
steak—rump	,,	10·70	10·50	10·71	8·29	12·00	8·80
shoulder	,,	4·95	6·60	5·57	3·71	6·60	4·60
stewing	,,	4·15	6·20	5·07	3·57	6·50	4·00
buttock	,,	5·78	6·70	6·00	4·14	8·20	5·20
Beef (corned), round	,,	7·25	7·00	7·00	5·14	8·60	6·15
brisket (with bone)	,,	3·69	4·40	5·10	3·64	7·00	4·30
,, (without bone)	,,	5·25	6·00	6·86	4·64	8·25	5·25
Mutton—legs	,,	8·15	11·60	10·14	6·71	12·80	9 00
shoulders	,,	5·35	7·80	7·57	3·50	8·00	5·60
loins	,,	7·80	11·60	10·14	6·71	11·60	9 20
necks	,,	5·75	9·60	6·10	4·07	7·60	3·60
chops—loin	,,	8·40	11·60	10·14	6·71	12 80	9·60
leg	,,	8·40	11·60	10·14	6 71	12·89	9·00
neck	,,	7·56	10·80	9·17	5·17	10·80	5·10
Lamb—forequarter	,,	7·00	9·00	7·33	7·33	11·00	8·00
hindquarter	,,	8·63	9·50	9·33	9 83	13·33	10·00
Pork (fresh) leg	,,	12·80	12·00	12·29	11·71	14·80	10 80
loin	,,	13·00	12·00	12·29	11·57	14·80	10·80
belly	,,	10·20	10·60	10·50	8·57	13·20	8·00
chops	,,	13·50	12·00	12·29	11·86	14·80	11·00

These figures were compiled in the office of the Registrar-General, Brisbane, on 6th September, 1927.

King & King, Ltd.

Music Warehouse, Queen Street
BRISBANE

Our unique 60-guinea Cabinet Model.

In our previous advertisements we illustrated our wonderful value 16-guinea and 20-guinea

Symphonas

We wish now to bring under your notice one of our De Luxe Models. Our High-Class Symphonas are "A thing of beauty and a joy for ever." They are built to satisfy the most exacting taste, and being

SYMPHONAS

the tone quality is supreme.

We are agents for—

The Famous Columbia Portable at 6 guineas, Decca Portable Phonograph, Columbia and Regal Records.

In Pianos and Player Pianos—

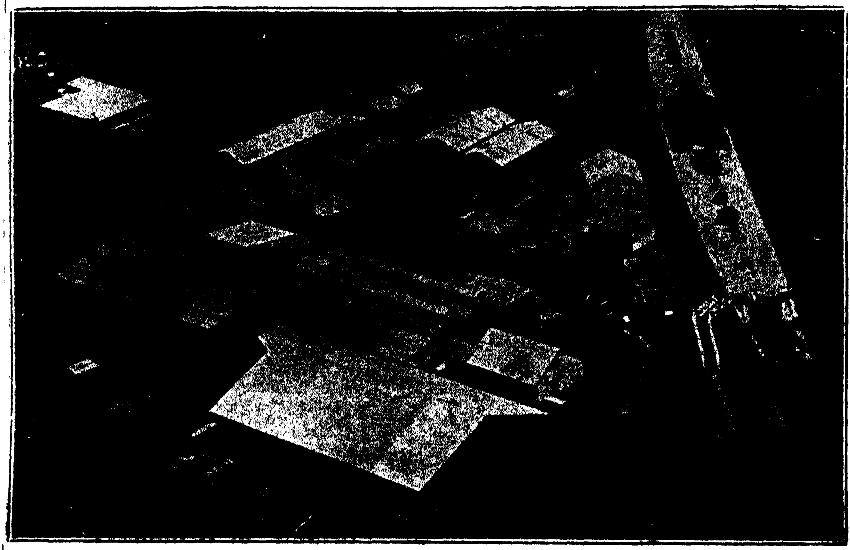
We offer the Highest Grade at reasonable prices. Our Agencies include—

THE BRINSMEAD
CABLE
GULBRANSEN
AUTO-HARMONIE

and other renowned makes.

We can satisfy all your musical wants
Write us for full particulars

McKenzie & Holland
(Australia) Pty. Ltd.
Electrical and Mechanical Engineers
Northgate - - - - Brisbane



Manufacturers of Complete Layouts and Junctions for Railways and Tramways, Dog Spikes, Rivets, Bolts, Nuts, etc.

Steel, Iron, and Brass Castings, Electric Welding, etc.

We Specialise in the Manufacture of
Bridge Ironwork, including Pile Shoes, Rings, Fishplates, Bolts, Washers, Deck Spikes, etc.

Quotations for your Requirements Promptly Submitted.

Telephones:
M 1131 and M 1132.

Telegraphic Address.
McKenzie Holland,
Nundah, Queensland.

PIG CLUB PROGRESS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Pig raising as an industry occupies a very important place in the agricultural life of Queensland, particularly in those districts on the coast, on the Downs, in the Burnett, and in the Central and far Northern districts of the State, where dairying and mixed farming hold sway, and where pigs are kept in conjunction with dairying and similar branches of agriculture.

In all of these districts, as well as in many of the fruit-growing centres and in centres comparatively close to the metropolis or provincial cities, numbers of boys and girls are growing up and are engaged in one or other of the jobs associated with the daily round of duties on the farm; this, in many instances, before they leave for school in the morning and on their return during the afternoon.

The problem we set out to face in the Pig Club Scheme is to give these girls and boys, and others interested, better ideas in regard to the breeding, feeding, management, and marketing of pigs of various breeds, grades, and ages.

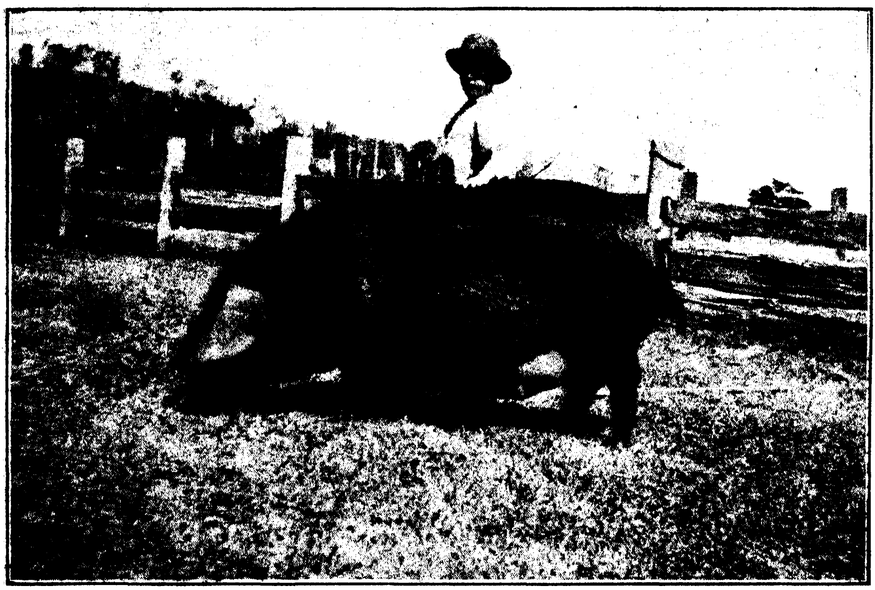


Plate 111 (Fig. 1).—An Enthusiastic Pig Club Member, George Davison, Junior, of the North Arm Pig Club.

George is the proud possessor of more than 100 guineas' worth of stud stock. In the first instance, he won a Large Black boar, donated by Captain Callcott, a Victorian breeder. He afterwards, with the assistance of his parents, purchased the Large Black sow, "Wattle Violet," shown in this photograph, and with her won first prize at the Royal National Show, Brisbane, August, 1927. Her first litter, numbering nine pigs, were actually valued at more than 90 guineas, one boar alone realising 14 guineas at public auction. "Wattle Violet" is one of the best Large Black sows in Australia to-day, and her proud owner is in Pig Club work to stay. (*See* also Fig. 2.)

One of the objectives of this description of the progress made is to illustrate by photograph and by review that we have attained some measure of success and have, to an extent, justified the expenditure in time, labour, and capital involved in the organisation.

From copies of previous reports which are available in pamphlet and extract form (to those sufficiently interested to write for same), it will be learned that Pig Clubs were first introduced and tried out several years ago on the return from overseas of Mr. J. D. Story, I.S.O., Public Service Commissioner, who submitted a complete scheme of organisation of the Home Project Scheme and recommended that it be put into operation. In the initial stages the scheme was handled through the Public Instruction Department, by the then Instructor in Agriculture, the late Mr. J. C. Stubbin, an official who travelled extensively and who gave the scheme much publicity. On the writer's appointment to the Department of Agriculture and Stock in 1923, the control of the Pig Club portion of the Home Project Scheme became part of the duties of the Instructor in Pig Raising, who immediately set to work to revive interest and extend the scope of operations of the club scheme to many new districts not previously touched or organised, and to many schools not previously visited.

Since then our itineraries have covered thousands of miles, hundreds of schools have been visited (there are more than 1,800 schools in this State alone), addresses have been given to thousands of children, and lantern lectures and practical demonstrations have been given wherever practical to both senior and junior farmers, and to women as well as the men and children.

Clubs have been formed in many districts and these clubs have embraced many schools. The extension of operations and the widening out of the scheme has necessarily called for more organisers and, in addition to the Assistant Instructor in Pig Raising (Mr. F. Bostock), and an understudy (Mr. J. Winders), in the Department of Agriculture and Stock, Mr. F. E. Watt, Organiser and Instructor in Agriculture in the Department of Public Instruction, has taken up the work, the latter engaging practically entirely in organising new clubs and in planning and assisting in carrying through club contests, club picnics, and other social activities associated with club life. Some forty or more clubs are in actual operation at the date of writing (September, 1927), these clubs covering approximately sixty schools and from 400 to 500 members.

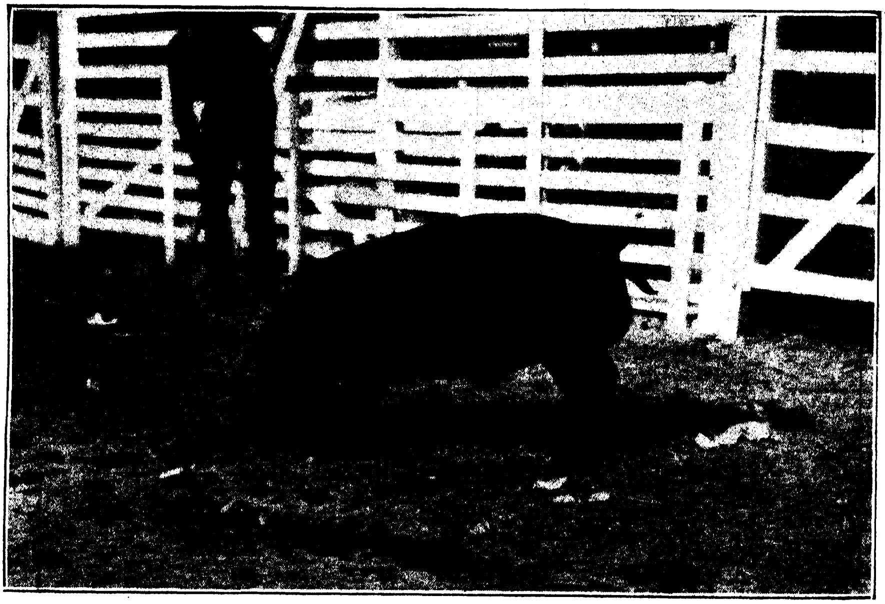


PLATE 112 (Fig. 2).—NORTH ARM PIG CLUB PIG.

Large Black Boar exhibited at Brisbane Royal National Show, 1927, by North Arm Pig Club. This boar, owned by Mr. George Davison, Junior, realised 14 guineas at public auction at the Stud Pig Sales. He represents the very best there is in the breed in Australia to-day.

None but those actually associated with the organisation of clubs and with their introduction into new districts have any idea of the difficulties to be faced or of the time involved in initiating pig clubs. Not only is it necessary to interest the school teachers and the children, but the parents have to be interested and to be convinced that the Pig Club Scheme is worth while, and a good business proposition that is going to put money into the pockets of the club members and not take too much out of the already busy lives of many of the school children.

At any rate, in face of all the difficulties, and as but one section of the many activities in which the Instructors engage, fresh clubs are being formed and new ground covered, while in practically every instance the initial club has proved to be but the forerunner of other and more successful clubs, with keener competition and with better financial results. The club movement is certainly exercising a highly beneficial influence in the pig raising industry and, in that sense alone, is paving the way to better things.

In an interesting and informative "write-up" of the Queensland Pig Club Scheme by Mr. F. W. Lydiard (F.W.L.), a Victorian representative of the "Argus" and the "Australasian," in a recent issue of the latter Journal, the progress made and the efficiency attained is specially emphasised.

Mr. Lydiard's opinion is that the "Pig Club movement is making substantial progress and, as stated above, is already exercising a highly beneficial influence." Members of the various clubs are taking a keen and intelligent interest in the work, many of the children displaying evidence of their proficiency in pig keeping.

It is a noteworthy fact that, in every instance where the children have received encouragement, however small, the results have proved that, not only can pig clubs be established, but that they can be made to play an important part in the development of the districts in which they are operating.

The Extension of the Scheme.

It is our objective to visit every school in those sections of the State suited to dairying and pig raising, to give lectures and practical demonstrations and to enlist the co-operation of both teachers, parents, and scholars, in the endeavour to initiate pig clubs (and other branches of the Home Project Scheme) in as many schools and districts as possible.

Considerable publicity has been given and is being given to the scheme, with benefit to all concerned, while many very satisfactory animals have been prepared for exhibition by pig club members. These animals, when brought together at local or district shows, have created a great deal of enthusiasm and healthy rivalry and have been the means of indirectly benefiting members financially and otherwise.

In the course of official inspection of the pigs owned and cared for by club members, it can honestly be said we rarely see an inferior animal. It can, with equal truth, be stated that in 99 per cent. of cases the pigs are accommodated and provided for in a manner much superior to that seen on farms in the majority of the districts throughout the State.

With us pig raising is essentially a crop-growing and farm foods utilisation proposition, hence the lessons to be learned are not only those associated with the actual handling and marketing of the animals, but more especially with cheapening the cost of production and with the more efficient control of the pigs on the farm. This is, in itself, a very big proposition and a very important one in a State like Queensland.

That pig clubs should become the medium through which many new purebred pigs will be introduced into the various districts is also one of the objectives of the scheme; in fact, this aspect of the business is specially emphasised and dealt with at length at all pig club gatherings, this particularly so as it is the objective throughout to so design the clubs that they will be of assistance to the children of the men on the land. With the objective of further assisting in the development of the purebred business, donations of purebred pigs have been made to a number of clubs, the selected animal usually being offered as a special prize in either the purebred classes or in the prime bacon pig classes.

The Department of Public Instruction, through the Queensland Agricultural High School and College, have, in this way, donated twenty purebred pigs to date, these pigs being distributed in various districts throughout the State.

Where possible, club members are urged in an endeavour to reduce cost of production to grow as much of the green food and root crops as they can, this being a very important feature in mixed farming districts. It not only teaches the club members the value of the farm foods utilisation part of the industry, but gives them a better knowledge of practical agriculture as it applies to pig keeping.

That "Cleanliness is next to Godliness" needs no emphasis, hence special stress is laid on the importance of sanitation and hygiene in and around the piggery. The pig is a clean animal if given a chance and if kept in surroundings favourable to development. That there is money in pigs if they are efficiently handled and bred along the right lines is also stressed, this being one of the cardinal points in the club scheme.

That co-operative effort pays is also prominently brought before the children, for the club scheme is a community organisation and as such has a bearing on the whole of the residents in the district.

This co-operative effort not only applies to the community interest, in so far as it relates to the production and marketing of the pigs, but in its relation to the exhibition of the competing animals at club contests and Agricultural Shows. Indeed, many Show Societies have given the movement their heartiest support and have quite readily supplied suitable accommodation and a schedule of classes. On occasion, these societies have offered silver cups, gold and silver medals, printed prize ribbons, trophies, and cash prizes. For all of these the entry has been liberal and competition keenly contested.

On numerous occasions, enthusiastic breeders in this and the other States have made liberal donations of stud stock, cash, and trophies to the club scheme; these donations have have created very considerable interest and we have definite evidence that they have been instrumental in building up the pig industry in this State. (See Figs. 1-6 inclusive.)

In the instance referred to in Fig. 1, a few additional details will serve to illustrate the point under review.

The club member referred to, George Davison, junr., of North Arm, won a Large Black boar at the North Arm Pig Club contest in 1926. This was followed up by the purchase from Victoria of the sow "Wattle Violet" at £28, from whose first litter, farrowed a few days after arrival in Queensland, the following pigs were secured:—

PLATE 113 (Fig. 3).—BERKSHIRE SOW, "DARTMOOR SARAH."

Purchased at Brisbane Show Sales by Mr. Geo. F. Davison for his daughter Eileen, also an enthusiastic Pig Club member of the North Arm school. George, junior, is here seen caring for this young sow while she poses for her photograph. The farm property and homestead, aptly called "Fair Hill," is in the background.

	£	s.	d.
2 Sows sold at 6 guineas each	12	12	0
1 Boar still for sale, valued at	8	8	0
3 Sows retained for breeding purposes and valued at 6 months old at 15 guineas each	47	5	0
2 Sows sold at 6 guineas each	12	12	0
1 Boar sold at public auction	14	14	0
Total, 2 boars and 7 sows realised	£95	11	0

The sow, "Wattle Violet," is still worth more than 30 guineas, while the boar, "Wattle Bruce," originally donated, is certainly worth more than 20 guineas.

Plate 114 (Fig 4).—Pomona Pig Club Pigs.

First Prize, trio of Tamworth Baconers, exhibited at Brisbane Show by Pomona Pig Club, the pigs being the property of the Alford boys from Traveston. Two of these pigs (sows) were sold as breeders, the other (a barrow) realising top bacon pig price at the factory.

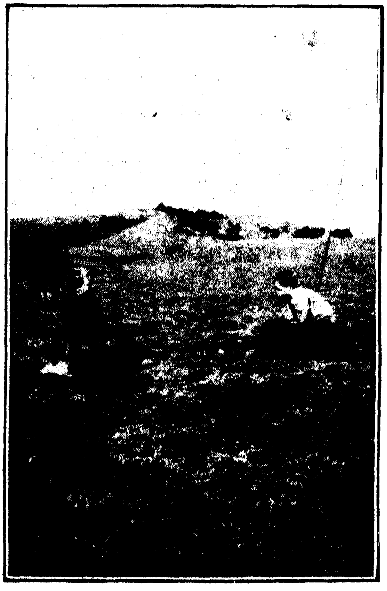


Plate 115 (Fig. 5).—Junior Pig Club Enthusiasts.

A snapshot from Allendale, Kureelpa, the home of the Cordwell boys, of whom three are members of the Mapleton District Pig Club. These juniors are keenly interested in "Better Pigs on Every Farm," their pigs seeming to be equally content with better conditions.

In connection with the sow "Wattle Violet" it is interesting to note the following extract from a letter received from the Davisons, at North Arm, under date, 19th September, 1927:—

> "You will be pleased to hear that 'Wattle Violet' has another lovely litter of nine pigs just a few days old—six sows and three boars. The boys are taking great care of these young pigs in the absence of their Dad, who is away in the South. Several of these pigs have already been booked at £6 6s. each as soon as they are ready to send out, which will be about Christmas time."

Another instance worthy of note forms the subject of Fig. 6, the Cordwells, of Kureelpa. These people are in club work to stay, and are convinced that the scheme should be extended wherever possible. Mr. Cordwell assured me that his farm revenue had increased by more than £100 per annum since his boys have taken up pig club work and have introduced better pigs. They are now the proud possessors of a herd of registered Poland-China pigs.

PLATE 116 (Fig. 6).

The Cordwell boys of "Allendale," Kureelpa, members of the Mapleton District Pig Club, with their father Ex Constable W. Cordwell, all workers in the Pig Club movement and all determined to make a success of the venture. Mr. Cordwell assures us that better pigs on his farm have increased the farm revenue by more than £100 per annum in the initial stages of development.

Another instance worthy of special note is the case of the Roy boys at Palmwoods, sons of Mr. and Mrs. C. F. A. Roy. These boys won a Middle Yorkshire boar "Kyabram Crystallograph," donated by Mr. Ralph Joyce, a noted Victorian breeder. This boar was won at the Nambour Show, 1926. Later in the year, they purchased from another club member, who was compelled by reason of circumstances to sell, a pedigreed sow also donated by Mr. Joyce and won at Nambour Show. This sow, in due course, farrowed a very fine litter, from which eleven pigs were reared. Of these, several were prize winners at Palmwoods, Nambour, and Brisbane Shows and were in all valued at from 3½ to 6 guineas each. The boar was finally sold at 15 guineas in order to secure unrelated blood and, writing under date, 20th September, 1927, Mr. Roy states that the sow "Kyabram Present" is expected to farrow again in a few days' time and shows promise of producing a very fine litter.

Fig. 4 also illustrates a pen of prize-winning baconers owned by the Alford boys, members of the Pomona Pig Club.

Numerous other instances could be recorded if space permitted to demonstrate the value of pig clubs in the actual building up of the pig industry.

Lessons Learned by Pig Club Members.

It has been the objective of the organisers of the Pig Club movement in Queensland to so tabulate results that they will appeal both to the club members as well as to their parents, and that they will prove of educational value to others interested in reading up the subject.

It is interesting to note that club members have learnt many valuable lessons as a result of their experiences in club work. In one instance we ''listened-in'' to a conversation between two club boys. One said to the other, ''Look here, Teddy, if you don't keep your pig clean and the pen nice and comfortable, he will get that disease which so many farmers seem to have had to fight. We club members are quite convinced that unless we keep our pigs and their sties and surroundings clean and in attractive order, we might as well be out of the club, for our pigs will have no hope of winning against those kept under more favourable conditions.''

It has been noted that the members have learned that pigs will not thrive and prove profitable when they are infested with lice and intestinal worms; they have learned that a good pig paddock is an absolute necessity in any system of pig keeping and that the provision of green food is equally necessary.

Plate 117 (Fig. 7).—An Old-stager in the Pig Business in Queensland.

Mr. Harry Severns, the venerable pig expert for many years in charge of the Stud Piggery at the Queensland Agricultural High School and College, Gatton. "Hairy" has been attending and exhibiting at Agricultural Shows throughout Queensland for more than forty years and has many championships and other coveted awards to his credit. He is still full of vim and as keenly interested as ever in winning a championship and in thus adding further laurels to the College herd.

Incidentally, they have been taught something about the diseases from which pigs suffer and of the economic loss resultant to the industry through condemnations at slaughter, through bruising and damage in transit, and through the numerous losses prior to the stage at which the pigs are prepared for the fattening or ''topping-off'' period. It is not, of course, expected, as a result of membership in one pig club, that a child can be turned out as an expert pig farmer. It is hoped, as time goes on, to make club work continuous, as far as is possible, and that commencing in the first instance with a pig at, say, weaning stage the club member will prepare the pig for a pork or bacon pig competition. Once having proved that they can successfully manage this part of the scheme, it is hoped, in the following season, to initiate them into the breeding sow competition, in which the member would start off with an in-pig sow or a sow approaching ten or twelve months of age and ready to be mated, and to carry this sow on through the gestation period to the time when the young pigs are born. We may even take up the Litter, Weight, and Bacon Pig Carcass Competition Schemes which created such a wonderful amount

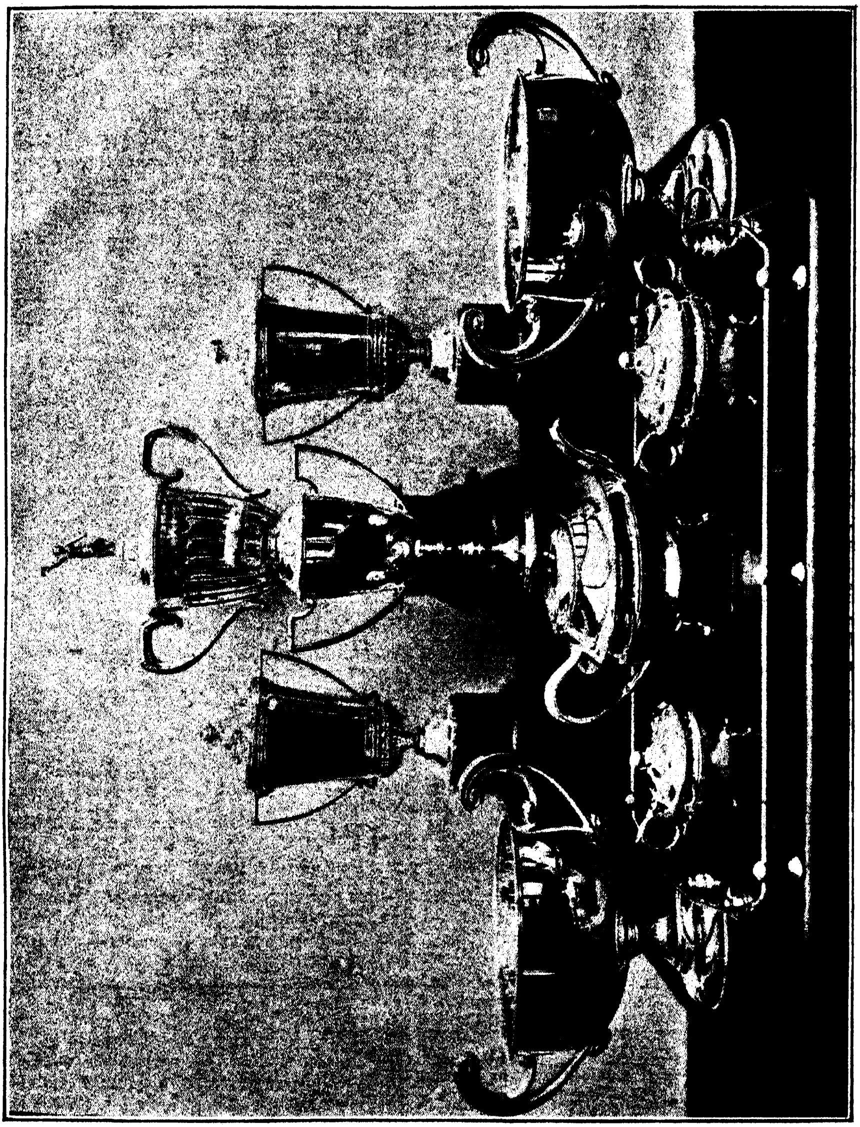


PLATE 118.—(*For Description of Plate, see page 405*).

of enthusiasm at this year's Brisbane Show. In due course, as a result of this training, it is anticipated that the senior members will enter young judges' competitions at agricultural shows and that, later on, they will be the proud possessors of and exhibitors of stud pigs and of other stock at the various shows throughout this and the sister States. A Breeding Sow Competition, the first to be started in Queensland, is at present in operation at the Jarvisfield Pig Club in the Ayr district of North Queensland.

The scheme has boundless possibilities. It needs careful handling and consistent support. It should be effective in teaching the children the value of farm life and the advantages of rural vocations. We have striven to teach the children the necessity of method and of the value of record keeping, even if the club records are kept only in a school exercise book. We hope some day that many of them will become active members of the Australian Stud Pig Breeders' Society, an organisation of immense value in the uplift of this particular industry. A constant effort has also been put forward to impress upon the minds of the parents that the pig club movement is here to stay and that, if the children are to become club members, they (the parents) must be prepared to co-operate; the children must be prepared to work and to keep on working, for pig raising is an industry which demands constant attention and a very much wider practical knowledge than many folks imagine.

That there is "Money in Pigs," there is not the slightest doubt at all, but club children have found that their margin of profit is considerably reduced, if not wiped out altogether, if they pay too liberal a price for store pigs when they join up as members of the club.

Unfortunately, thousands of farmers throughout Queensland have suffered financially and are still suffering by reason of the same cause, for the prices paid for store pigs—i.e., pigs that are purchased when quite young for fattening purposes—are frequently out of all proportion to the price finally realised for the pigs when they reach the factory. This lesson alone is one which should prove of untold value to club members.

PIG RAISING AWARDS.

(*See Plate* 118, *page* 404).

The pig section at the Royal National Show at Brisbane continues to attract attention, each year's Exhibition proving of greater interest than its predecessor.

This year quite an array of silver cups and trophies were offered for competition, with numerous cash prizes, ribbons, and prize cards. Competition in most of the sections thus competed for were keen and evenly contested.

Details of the silver cups and trophies illustrated on page 404 are as follows, with details of donors and winners:—

Front Row.—Silver tea and coffee service, presented by R. G. Watson, Esq., Stud Pig Salesman, Inns of Court, Adelaide street, Brisbane, for the most successful exhibitor in the pig section, won by Mr. H. Franke, of Cawdor, Crow's Nest Line.

Second Row (Left).—Silver cup, presented by David Webster and Sons, Ltd., Annerley road, South Brisbane, in the bacon pig carcass contest, won by Percy V. Campbell, Lawn Hill, Lamington.

Second Row (Right).—Silver cup, presented by David Webster and Sons, Ltd., Annerley road, South Brisbane, for boar and his progeny (Poland-Chinas), won by Queensland Agricultural High School and College, Gatton, Queensland.

Third Row (Left and Right).—Silver cups, presented by the National Pig Breeders' Association, London, for the best Tamworth boar and the best Tamworth sow exhibited, both won by the Queensland Agricultural High School and College, Gatton.

Centre.—Silver cup, presented by Messrs. Cribb and Foote, Ipswich, for Tamworth boar and progeny, won by the Kingston Pig Farm Co., Kingston, Queensland, Mr. R. G. Watson, proprietor.

Back Row.—Silver cup, presented by the Estate of the late W. J. Warburton, Northgate Junction, for Berkshire boar and progeny, won by Mr. H. Franke, of Cawdor.

The Empire Challenge Cup, presented by the British Berkshire Society for best Berkshire boar, was won by Mr. H. Franke, of Cawdor.

The Empire Challenge Cup for Berkshire sow, presented by the British Berkshire Society, was also won by Mr. H. Franke.

These cups, trophies, and the other numerous prizes presented are of considerable value in creating additional interest and in inducing added competition.

Further donations of similar trophies will always be appreciated by exhibitors in the pig section.

QUEENSLAND OVERSEAS.

A description of the New Zealand and South Seas Exhibition at Dunedin, under the title of "Queensland Overseas," by Mr. H. W. Mobsby, of the Department of Agriculture and Stock, the Queensland Government Representative at the Exhibition, broadcast recently from 4QG, was heard distinctly in New Zealand. Mr. Mobsby, in addition to an appreciative cable from some prominent citizens in Dunedin, has since received a number of letters and press references to his talks which indicate the widespread interest they aroused in the Dominion.

Commenting on his initial address the Dunedin "Evening Standard" had this to say:—

> "Last night several of Mr. H. W. Mobsby's Dunedin friends listened-in to an address broadcasted from 4QG Brisbane. Mr. Mobsby, it will be remembered, was the Queensland Government Commissioner at the New Zealand and South Seas Exhibition, and it was obvious from his remarks last night that he still retained vivid and pleasant recollections of his stay in our midst. Mr. Mobsby's talk was all about our Exhibition, and he spoke in terms of admiration of the organising and business ability displayed by those responsible for it. He also referred to the wonderful work of the Otago Harbour Board in reclaiming Logan Park, to the gift of the Art Gallery to the city by Mr. and Mrs. P. R. Sargood, and to other features of our life here which struck him as being particularly praiseworthy in view of the size of the community. The whole address was distinctly heard, and at least one group of listeners-in who had personal acquaintance with Mr. Mobsby despatched a cable to him immediately, announcing the clear reception and extending the good wishes of his Dunedin friends to the speaker."

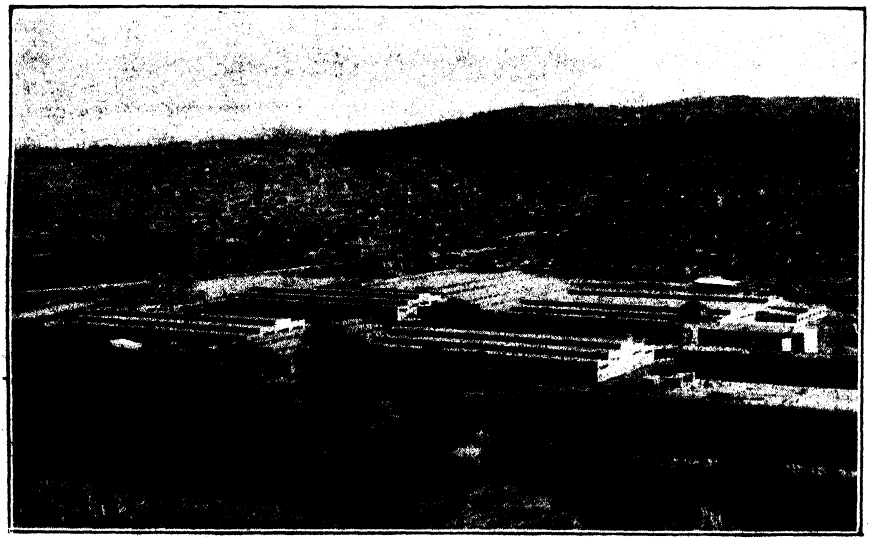


PLATE 119.—VIEW OF THE NEW ZEALAND AND SOUTH SEAS EXHIBITION, DUNEDIN, NEW ZEALAND, 1925-26.

"A GOOD, USEFUL JOURNAL."

A Eudlo farmer writes: "My friends in England say we are lucky farmers to have such a good, useful Journal offered so cheaply. When finished with I post the Journal home."

RURAL FIRES.

By E. H. F. SWAIN, Chairman, Queensland Forestry Board.

The firestick habit in Australia commenced with the aborigine, who made concentrated hunting grounds by setting fire, in winter time, to the ungrazed dry grass in patches. To these patches game would be lured by the new green shoots that followed the burn, whether it rained or not, and there they were readily found and speared. The white pioneer in his turn discovered that his cattle became hidebound when feeding on the old dry grass accumulations, and that by using the aboriginal method he could materialise with fire a new crop of herbage, rich in mineral salts, upon which his cattle thrived, their bowels loosening and their coats softening. Similarly in consuming the trash of his forest clearings, the new selector found fire to be a settler's blessing. The use of fire in converting forests to farms and as an ever-ready and cheap method of pasture cultivation. This became a white man's habit and since then Australia has been burned and grazed and burned and grazed as it never was burned and grazed before. At this stage the rural population is so enamoured of the use of fire in converting forests to farms and as an ever-ready and cheap method of of in the winter time, the bushman blithely distributes his matches and the schoolboy is learning to follow in father's footsteps.

I am reminded of the history of the discovery by the Chinese of the merits of roast sucking pig, as related by Charles Lamb. A Chinese peasant lamenting the total destruction of his home by an accidental fire suddenly noticed a delicious aroma proceeding from the ruins. Investigation disclosed an incinerated pig. He was impelled to taste the flesh, and called his neighbour in to participate. They were so impressed that an epidemic of incendiarism set in, people burning down their homes in wholesale fashion in order to realise the delights of roast sucking pig. Much destruction of life and property resulted from the growing practice of pig-roasting until some Chinese genius worked out the theory of the cooking oven, with which the advantages of the new dish might be extracted without incurring the cost of the previous procedure.

The Fire Hazard in Queensland.

The Australian practice of indiscriminate firing is not very different from the original Chinese method of roasting pork. The fact that the Chinese were successful eventually in isolating the advantages of fire from its disadvantages, leaves me hopeful that we in Australia may be equally successful eventually in the matter of our rural burning activities. With the development of closer settlement, the building of homesteads, the making of improvements, the ringbarking of the hardwood forests and the consequent thickening of the pasturage, the accumulation of slash in the logged-over timber reserves, the ringbarking of useless trees during the improvements of our hardwood forests, and the felling of scrub for our new plantations, the fire hazard in Queensland is going to assume most formidable dimensions in the future, and we in forestry are concerned for the safety of the new softwood forests which we have begun to establish against the prospective needs in wood of the State.

The Teaching of Forestry.

Quite apart from the incidental dangers of fire use, firing is not an unmixed blessing, and indeed may be like strychnine—a stimulant in small doses, and a poison in big. The teachings of forestry are that fire damages the hardwood stands, perceptibly and imperceptibly, in root, bole, and branch, the winds break off the dead and brittle timber, gum veins develop and white ants gain ingress to the heart of the tree, so that most of our Eucalyptian hardwood trees are hollow, and the financial losses resulting to the Forestry Department, the timber-getter, the sawmilling industry, and the community at large can be measured only in hundreds of thousands of pounds annually. Also, whilst it is true that the widespread firing of the bush by the white pioneers in this country and the resulting grazing of cattle cleared off the heavy grass accumulation in the original park-like Eucalyptus forests, and permitted a new generation of Eucalyptus poles to thicken up the stands so that it is no longer possible to hunt kangaroos at a hand gallop through the bush, it is also true that the recurrent fires have decimated and damaged this regeneration and assured us of a further crop of white-ant infested logs for the future. But whilst the Eucalypts by their hardiness do at least survive and continue to reproduce, the more delicate Hoop and Bunya and Cypress pines are killed by the first whiff of fire, and it is not too much to say that the smallness of our softwood resources and our consequent softwood shortage has been accentuated by the Australian bush fire habit. Hoop and Bunya and Cypress pines ordinarily come into the forest mixture as an underwood to the Eucalyptus trees, and the succession is then through shrubbery to jungle. Had there been no fires in Australia it is certain that the Eucalyptian woodland would have been succeeded to a large degree by extending stands of Hoop, Bunya, and Cypress pine, and that Hoop pine would be found further westward than it occurs to-day.

Moreover, our areas of agricultural land would have been more extensive than they are now because the pine trees and their associates enrich the soils. It is a teaching of forestry that the forest humus represents fertility, that its production and conservation on the forest floor means greater response in tree growth, and that its destruction or removal produces a stale and unprofitable stand.

The Farmer May Learn from the Forester.

In these connections, agriculture has something to learn from silviculture. The continued firing of the farm lands, the exposure of the soil to slow sterilisation of the sun, the compacting of the surface by rain, all these things are mopping up the fertility fund of the country, the basis of its prosperity.

The selector and the surveyor appraise the value of the soil according to the vegetation which it sports. The fact that vegetation too often is really only the fire survival of the site shows that the sterility of the site is not so much to be condemned as the fire which helped to make it so.

The fertility of banana lands continues for only five or six years and the depreciation of the farm is ascribed ordinarily to the high demands of the banana plant upon the soil, but the original burning off of the forest lumber, despite the temporary stimulus given to the soil, combined with the subsequent exposure to sun and rain, have probably as much to do with the early deterioration of the site as the species demands. A successful application of silvicultural principles to rubber plantations recently recorded in the "American Journal of Forestry" confirms this view. On Fraser Island, our experience has been that the initial burn has incinerated the humus and that the new forest stagnates until the weeds have come to the rescue and restored the coolness and humidity of the soil by their shade and humus. Apart from the losses to the country resulting from the destruction by fire of material improvements such as fences and house and telegraph lines, and of badly needed grass in drought time, and in the diversion of labour from profitable occupation to fire extinction, I am satisfied that a strong indictment can be made out against constant firing on general grounds. Expecting when I came to Queensland to see a land of humid jungle, the most vivid first impression made upon my mind was the baked and burned appearance of the land, except in the moisture basins of the coast where the congregations of damp scrub vegetation have protected them from the fires which seem to have ravaged the rest of the landscape. From the point of view of my silvicultural lessons I cannot but feel some apprehension for the continued agricultural fertility of the soils of Queensland if they are to be continually burned.

Fire Control.

There can be no question of trying to prohibit the practice of rural firing. The issue is rather one of fire regulation and control, and having in mind the values which in the future will stand in danger from the unbridled employment of the individual firestick, I am convinced that the appointment of this committee is opportune, and that the time has arrived for the State itself to assume the responsibility of organising and supervising rural firing and of safeguarding the general estate from damage and loss. The issue is clearly one of community and not of individual concern, and I take it that the first step is to place the individual fire lighter under community restraint.

To this end I suggest the establishment, under the Ministry of Public Lands, of a Rural Fires Bureau, to be charged with the administration of a new fire code the substitution and extension of the Careless Use of Fires Act, which, dated 1865, is little more than a police measure and lacks the conception of administration.

The purpose of the new code should be the organisation adn supervision of rural burning-off operations in the community's interests. It can be officered from within the Department of Lands. Under such a code the State might be partitioned into Rural Fire Districts in charge of a Rural Fires Warden who might be the Land Commissioner, or in a forest district, as on Fraser Island, the District Forester. Under the Rural Fires Warden, the Land Rangers, Forest Officers, Crown Land Bailiff, Police and other gentlemen might become Rural Fires Rangers organised as district patrols under the Rural Fires Warden.

A Rural Fires Organisation.

In such manner a Rural Fires Organisation can be set up so that public opinion may know upon whom to fasten responsibility for the control and extinction of bush fires. At present there seems to be no real responsibility vested in anyone, and this is the fundamental defect in the present arrangements.

For the greater part of the year the Rural Fires Organisation would be inactive. It need operate actively only around the periods of high fire hazard, when the aridity is greatest—that is, ordinariliy, towards the end of winter and until the commencement of the summer rains. The length of the fire hazard period will depend upon the seasons and the district, and in drought years when the aridity is greatest the period naturally would be longer.

I think that the basis of the fire code should be the declaration by districts each year of a period of firè hazard during which the fire code would be in active operation. During such periods of fire hazard, which would vary according to the region, all burning-off operations should be prohibited except such as may be specified by the Rural Fires Warden, such as the firing of felled timber where artificial grasses or crops are to be sown after the burn. The permission to burn, whether granted by individual permit or by general declaration, should be conditioned according to regional necessities, but one condition should be compulsory notification by the lighter of the Warden and of his neighbours.

A central principle of fire code should be that each landholder is responsible for fires, whether authorised or accidental which break out on his land, and that such responsibility involves both notification of neighbours and Warden and of confinement of the fire to within his own boundaries.

Each landholder should be held responsible up to a specified maximum for damage done by fires which escape from his land.

There appears to be no other manner of bush fire control than to share out the responsibility in this way under an organised scheme. The first law of bush fire control is prevention and the second the earliest possible detection and suppression.

Incendiarism should be punished by arrest and imprisonment, but as incendiarism can seldom be proven against an offender there should probably be provision for arrest as suspicious characters of trespassers discovered in front of a trail of unauthorised fires. During the fire hazard season no person should be allowed to enter Crown lands without a permit of some kind, and permit holders or timber operators should be required to accept for the area of their operations the fire responsibilities attaching to a landholder or lessee of land.

Wax matches might also be prohibited during the close season, and the being in possession of wax matches during such season might be made an offence under the fire code. One effect of the prohibition would be to remind people of the existence of a fire code.

Fire Prevention.

The earliest possible suppression of small bush fires is the best method of preventing big ones. A small fire may burn for weeks without becoming a danger until a period of high aridity and fanning breezes ensues and converts the small fire into a self-motived conflagration developing its own impelling draught.

I understand that the Benarkin forest fire was burning untended on private land adjoining for a fortnight before it became a conflagration and swept through the State Forest defences. In fire fighting the best method of defence is counter attack, and the fire should have been extinguished on private land at the beginning. In such cases and for the purpose of defending his property from damage, a landholder might well be authorised to enter his neighbour's property to extinguish a menacing fire or to counter-fire it.

Despite close seasons and fire permits and notifications, and the vesting of responsibility in individual landholders, fires will be lit and responsbility will be denied. In such case, I think it fundamental that the Warden should be vested with power to extinguish unauthorised fires at the cost of the landholder. Such a provision will deter the lighting of such unauthorised fires, compel their tending and extinction, and bring about an automatic conformity to the code.

The Rural Fires Bureau should be authorised to issue leaflets, fire posters, and fire warnings, and to resort to publicity in order to develop a fire conscience in the community. The code should contain a provision that each box of matches sold during the fire season should bear a fire warning to be drafted by the Rural Fires Bureau.

The Warden should arrange for proper fire patrol of his region during the close season and for the supervision of permitted burning. Land Rangers, Forest Officers, and Police will constitute the nucleus of the patrol force.

There need be no distinction in law between Crown lands, State forests, and private lands so far as the fire laws are concerned. The same restrictions and responsibilities should apply all round. The code should aim directly for its objective, which is that fire should be the servant of the State—under delegation to the individual landholder for his specific purposes—and that the landholder or occupier should be responsible for the actions of his servant. There can be no fire regulation unless responsibility is attachable to the user.

Forests not Fireproof.

So far as forestry is concerned, foresters realise that forests will always be inflammable and can never be made fire-proof by fire-breaks. If the ideal of silviculture is to be realised the forests will be rendered even more inflammable than they are now, because debris will be allowed to accumulate in the belief that it represents fertility and makes for fast development of the wood crop. The desire of the forester is to exclude fire entirely from the growing crop.

It has been suggested that in the case of Eucalyptus forests the ideal of fire exclusion and humus accumulation should be dropped, and slow burning in winter time or at night time adopted in order to render the stand fire-proof. Whilst this compromise is better than unrestrained dry-time burning, it still strikes at the gospel of the silviculturist. Forestry does not want to resort to this compromise if it can be avoided, and so far as is humanly possible it wants to conserve the forest fertility instead of consuming it. After all, bush fires are lit, wilfully or carelessly, by individuals, and the first point of attack upon the forest fire problem is to "swat" the incendiarist, to put the fire fool under restraint, and to regulate and control legitimate rural firing. When that is done it may be possible to deal with the then reduced loose fires by defence. With the issue of forest fires is bound up the question of forest grazing, and this opens up the issue of disposing of the forest pasturage, most of it by leasing on agistment, and a modicum by direct departmental grazing. In this connection grazing and Eucalyptus silviculture are bound together, and, as well as road-fire-breaks, we will set apart the boundary compartments for winter burning to act as fire-breaks and grazing forests whilst we practice the ideal of humus retention in the inner areas of the forest.

LEMONS.

Lemons should be cut from the tree when showing the first indication of colouring. In cutting, an orange clipper is most suitable, its shape admitting of severing the stem close to the petioles. The gathered fruit is then stored without being subjected to undue pressure—consequently not more than three or four deep—in a covered airy situation for about a fortnight to allow evaporation of skin moisture. In consistently dry districts no further treatment is necessary beyond wrapping, casing, and storing in a cool situation, but where atmospheric conditions are frequently changing, storing the fruit in dry fine sand has been found the most satisfactory, sufficient sand being used to prevent actual contact of fruit. Petrol cases may conveniently be used for this purpose. The fruit should be gathered in fine weather during afternoon sunshine. Careful handling is most essential.—GEO. WILLIAMS, Acting Director of Fruit Culture.

AN APPRECIATIVE CORRESPONDENT.

Thus a correspondent writing under date 8th September, 1927: "In the package of agricultural literature received safely to-day, my request of a few days ago has brought a reply that I dared not hope for. Needless to say, I much appreciate your kindness, and you can be assured that the perusal of same will give me much pleasure. The only 'fly in the ointment' is that a casual glance through shows how agricultural science has extended, how little I know, and how much accumulated rust I must knock off."

Buy

RELIABLE TYPEWRITERS

from a

RELIABLE FIRM.

We are Sole Agents for—

L. C. SMITH silent ball-bearing Typewriters
CORONA - - Portable Typewriters
GESTETNER - All British Duplicators
DALTON - - Adding Machines
MARCHANT - Calculating Machines

WE also have a large stock of second-hand Typewriters of all makes, thoroughly reliable, fully guaranteed, and at prices from £5 to £20. Terms from £1 deposit and £1 monthly can be arranged to suit clients. Everything we sell is fully guaranteed. Write for particulars.

ESTABLISHED 1903

MACDOUGALLS LTD.

(formerly Australian Typewriter Supplies Co.)

363-365 Queen Street

Box 345 **BRISBANE** *'Phone: 717-718*

There is Money in Trees!

By Investing in the Largest Commercial Company in the World.

N.Z. Perpetual Forests Ltd.

PAID UP CAPITAL £128,650
BOND CAPITAL EXCEEDS £2,250,000
TRUSTEE RESERVE FUNDS representing One-third on all fully paid Bonds to 1st July, 1927 £52,641

Like all Successful Companies, Imitators speedily arrive, therefore the ***public are warned*** *not to confuse the securities and protection of the* ***N.Z. PERPETUAL FORESTRY Ltd.*** *with any other Forestry Company.*

Write for Illustrated Booklet.

Smith, Wylie & Co. Ltd., Griffith House, Brisbane.

Name..

Address..

BRUNNING

BEST FOR BEARING

FRUIT TREES

(True to Name and Healthy)

are planted throughout Australasia. Apples, Pears, Plums, Peaches, Nectarines, Quinces, Mulberries, Oranges, Lemons, etc.

Shipments made to all Parts of the World.

JOHN BRUNNING & SONS

Established 60 Years

SOMERVILLE NURSERIES
SOMERVILLE, VICTORIA, AUSTRALIA

Chicks-Chicks-Chicks

Day-old Utility

Black Orpington and White Leghorns

From World's record laying strain. We are now booking orders for delivery from June to October. £5 per hundred, £2 10s. for fifty, 15s. per dozen; special quote for larger quantities. 10s. per 100 secures booking, freight paid. Instructions for feeding, etc., supplied with every order. Also settings 7s. 6d. Stock for sale. *Square deal guaranteed. Correspondence invited.*

Woodlands Poultry Farm
Beerwah, Queensland

PRIZE-WINNING QUEENSLAND BUTTER.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that he was highly pleased to read of the success of the Queensland dairy factories at the Melbourne Show. He desired to congratulate the management of the Oakey District Co-operative Butter Association, the Downs Co-operative Dairy Association, and the Pittsworth Dairy Company, whose exhibits of butter and cheese had added further laurels to Queensland manufactures of dairy produce. The gaining of first prizes in the competition in Melbourne, whereat factories from each of the dairy-producing States of the Commonwealth had exhibited, indicated that methods of manufacture here were quite abreast of those in the Southern States, and he hoped that it would inspire the manufacturers to make increased efforts to improve the quality of their output, for by so doing the returns to the producers of the raw products would be enhanced, and the reputation of Queensland dairy products on the oversea markets would be further improved.

THE ARTIFICIAL COLOURING OF CITRUS FRUITS.

By D. B. FERGUSON.

It must be obvious to all that well-coloured oranges and lemons will command a higher price on the market than those in a semi-green state. This would apply to a much greater extent on the Southern markets.

Queensland growers no doubt realise that their fruit is fit for domestic purposes many weeks prior to attaining the degree of colouring that the market desires. Citriculturists who have had experience in various citrus-growing localities will agree that oranges grown in the cooler regions have ample colour long before they attain sufficient sugar to make them desirable for eating purposes, while those produced in warmer climates are sweet and luscious for some time prior to taking on the deep orange appearance which commands the higher price on the market. There is ample room in the Southern States for the production of fruit for the late market, and as the producing cost is somewhat less in those districts, the Queensland grower would be well advised to devote his attention chiefly to the supply of early fruit, and consequently he would reap the advantages of the high prices prevailing in the early part of the season. Hundreds of bushels of sweet oranges can be found in our groves during the month of April, and if these had colour together with a freedom from blemish, sugar, juice, and an attractive pack, all of which are features which command higher prices, they would be worth up to 30s. a bushel during that month and also the month of May.

Method.

Oranges and lemons, provided they have reached a state of maturity, can be coloured with very little expense in a short space of time.

A gas-tight room is required; in size it may be large or small. This would depend upon the quantity of fruit which the grower desires to colour each four or five days. It need not be an expensive structure; the roughest of timber would serve, provided it was lined with paper or any material which would prevent the escape of gas. The fruit, after being harvested, is placed loosely in lug boxes. A size which is capable of holding about a bushel is the most convenient. It is essential, however, that these are of a design which will allow the gas to circulate around the fruit when the boxes are stacked one on top of the other. They may be constructed with spaces between the boards on the side, with lugs across the top which will prevent one box from sitting tightly on top of another. The ordinary kerosene case could be used satisfactorily if opened on the side and 2 x 1 in. slats attached at each end of the opening. There should be a space of two inches between each stack of boxes and the wall to provide space for the gas to move freely. The next procedure is to produce the colouring agent. Any form of carbonic acid gas will do. This in California is put up commercially in cylinders, but prior to this recent development the exhaust from a motor and the burning of kerosene lamps were the general methods adopted for the production of gas. If the motor is used a pipe is taken from the exhaust and passed into the colouring chamber through a hole in the wall. If lamps, it is merely a matter of burning the ordinary kerosene wick type.

A chamber 20 ft. by 20 ft. by 12 ft. high would require three of the circular burner type of lamp similar to those used in the kitchen. These, of course, can be purchased, less fittings, and are not an expensive item. In short, it is replacing the oxygen in the chamber with carbon monoxide and carbon dioxide which brings about the change in colour.

The time required is from three to five days. The writer is in doubt as to whether it is known actually what happens within the tissues of the rind. The process, however, has no ill effect upon the pulp of the fruit.

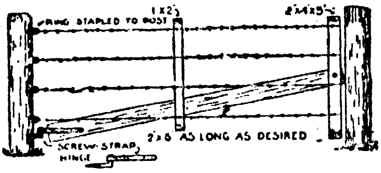
In order to preserve the keeping qualities, it is advisable to avoid atmospheric moisture and also keep the temperature as low as possible. After the lamps have been burning for some time, they will go out. This is due to the absence of oxygen in the air—that having been burnt—but the colouring process continues. They should be relighted twice daily. The lamps should be prevented from smoking, as this causes soot to settle on the fruit which is somewhat difficult to remove.

Market Standards.

There are periods in the year when the lemon market becomes glutted, and it would naturally follow that lemons were most plentiful. Green fruit will keep considerably longer than that in a ripe state. In localities where fruit will keep a grower may overcome the glutted market problem by harvesting immediately the crop reaches maturity and storing until prices are better, when the fruit can be quickly coloured and placed on the market. In different parts of the world where this treatment has been practised, it has also been abused in some cases, in that fruit in an immature state has been coloured and forwarded to the consumer. This, of course, has a detrimental effect on the industry generally. It is rather lamentable that such growers should exist. The difficulty, however, was overcome in California by setting a sugar standard for all oranges going to the market.

AN IMPROVED WIRE GATE.

Our earlier settlers who satisfied themselves with the usual wire gate, will recognise in this illustration, from the "Country Gentleman," United States of America, an advance on the general construction of this gate. This gate may be readily made of split timber, and the bending of straps of the iron hinge is not difficult. The weight of the stay or strut will keep the wires in position and fairly taut. Of course, the lateral or side swing of the gate when it is being opened or closed remains a great objection to the use of the unframed gate.



THE JOURNAL IN HOLLAND—A REPEATED DEMAND.

Professor J. K. Murray, of the Queensland University, and Principal of the Queensland Agricultural High School and College, writes: "I am glad to be able to forward the enclosed appreciative letter in regard to your Journal." The enclosure is a letter from the State Agricultural Library, Wageningen, Holland, in the course of which the writer, among other complimentary references, says: "There is a repeated demand here for the 'Queensland Agricultural Journal.' As this Journal seems not to be complete in any of the public libraries of our country, we will be much pleased to purchase it for our library. . . ."

Answers to Correspondents.

A Tourist's Criticism.

A CORRESPONDENT (Brisbane)—

We had an opportunity of meeting the distinguished visitor from England when he was here, and were not at all impressed by his superficial knowledge of Australian problems. He evidently came here with preconceived notions of Australian life and industries, and they were not modified by his closer acquaintance with Australian conditions during a very hurried tour through the Commonwealth. His statement, for instance—"I have not seen a first-class banana in Australia" is evidence of his bias; especially when Queensland-grown fruit was being marketed in Sydney as "first-class Fiji bananas" at 3d. each. Those engaged in the trade know that Queensland bananas for quality and flavour are not surpassed by the product of any other country. There are other remarks of this visitor obviously based on misinformation; consequently we do not feel called upon to give further publicity to his statements, which display lack of essential knowledge. All the same we appreciate your kind interest in the Journal and the suggestion you offer, and would be glad at any time to receive further information from you which you consider of print value.

Analysis of Bush Hay.

INQUIRER (Rockhampton)—

Your specimens were referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises as follows:—

	Bush Hay. Per cent.	Good Mitchell Grass. Per cent.
Moisture	10.4	7.2
Crude Protein	3.9	7.4
Carbohydrates	44.7	43.3
Crude Fat	1.3	0.9
Crude Fibre	29.3	30.0
Crude Ash	10.4	11.2

This hay is of low nutritious value as compared with a good Mitchell grass, obtained from Longreach district. Sheep forced to live on it would perish on account of protein starvation, as only one-half of crude protein is digestible.

A 100-lb. sheep requires per day—2 lb. dry substance containing at least .12 lb. of digestible protein, and 2 lb. of above hay would only give .04 lb. of protein. About ¾ lb. of Kubettes or ⅓ lb. of treacle cubes would supply the deficiency of protein. Nearly 2 lb. of maize would be required to give the same amount of additional protein. Of course, in practice, much smaller amounts would keep the sheep from starving.

Wowan Soils.

L.M. (Wowan)—

With reference to your inquiry *re* fertilising of soil prior to sowing it under cotton, the Assistant Agricultural Chemist, Mr. E. H. Gurney, advises as follows:—

Analyses of some soils from Wowan and district show that these soils upon the whole contain fair amounts of total and available lime, phosphoric acid, and potash. The humus content in some of them could, with benefit, be increased for growth of cotton crops, and it is recommended that leguminous crops, and when possible farmyard manure, be ploughed in, thus improving texture of soil and increasing soil nitrogen and humus content. A fair amount of phosphoric acid in the soil is necessary for the most successful cotton crop, but better results are obtained by application of artificial fertilisers if soil contains a fair amount of humus. Fertilisers for cotton crops will be found in pamphlet "Complete Fertilisers for Farm and Orchard," which is being forwarded under separate cover.

Wood Ashes as Fertiliser.

H.G.H. (Wondecla, N.Q.)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows regarding your inquiry concerning the use of wood ashes:—

> "The ash of ironbark, bloodwood, &c., contains from 2 to 4 per cent. of phosphoric acid, 6 to 12 per cent. of potash, and 12 to 20 per cent. of lime, and is therefore a valuable fertiliser, applied at the rate of 5 to 10 cwt. per acre for grape vines."

BOTANY.

Selections from the outward mail of the Government Botanist, Mr. C. T. White, F.L.S., which are of general interest.

Eucalyptus Baileyana.

INQUIRER (Brisbane)—

Your specimen proved to be *Eucalyptus Baileyana,* a species not previously known from the Toowoomba district.

Plants from South Burnett.

W.R. (Kawl Kawl, Proston Line)—Your specimens have been determined as follows:—

No. 1. *Pteris falcata* var. *paradoxa.* A fern fairly common in the drier scrubs of South-Eastern Queensland. The fertile fronds are longer and narrower than the sterile.

No. 2. *Acacia fimbriata.* Queensland Golden Wattle. One of the most ornamental of wattles.

No. 3. *Hovea longifolia.* Family Leguminosæ. This and an allied species (*H. acutifolia*) are commonly called "Bush Sarsaparilla" as distinct from the trailing sort *Hardenbergia monophylla.*

No. 4. A species of Daviesia or allied genus; flowers or pods required to determine.

Regarding your query re journals devoted to botany we may say there is a great number of these in existence, but practically all we know of are purely technical. In most of the States in Australia, however, there is a Naturalists' Club, and they issue journals devoted to general natural history, including botany. The Queensland Naturalists' Club, for example, issues the "Queensland Naturalist." The best way to obtain this is to become a member of the Naturalists' Club (country membership 5s. per year, including the journal). This is issued quarterly as far as possible, but I doubt if it is exactly what you require. The name and address of the Honorary Secretary is, Miss E. E. Baird, Kennedy Terrace, Red Hill, Brisbane.

Canavalia obtusifolia.

W.K. (Boulder Creek)—

Your specimen was received through Mr. J. Peterson, M.L.A., for identification and report. It is *Canavalia obtusifolia,* a bean allied to the Sword Bean and Jack Bean, widely distributed in Queensland, though perhaps not very abundant in any one place. We have not heard a common name for it. Nothing very definite is known of its properties, but it is generally regarded as poisonous.

The Common Mallow—Its Stock Food Value.

P.H.G. (Trueman, Q.)—

The weed is *Malva parviflora,* the common Mallow, a native of Europe, now widely spread as a weed over the warmer temperate regions of the globe. This plant, along with others of the Mallow family, was, until quite recently, always looked upon as quite harmless, but investigations in New South Wales have shown it to be capable of causing staggers in stock. The weed has to be eaten in great quantities to cause this trouble, and I do not think it occurs here in sufficient quantity to be looked upon with fear, as in reasonable quantities it is a valuable forage, both green and dry.

Aquatic Plants in the Brisbane District.

Inquirer (Brisbane)—Subjoined is a list of aquatic plants found in fresh water in the Brisbane area:—

Jussiæa repens. Clove Strip or Primrose-Willow (the name Evening Primrose more correctly belongs to plants of the genus *Oenothera*).
Hydrilla verticellata. Water Thyme.
Eichhornia speciosa. The Water Hyacinth.
Ceratophyllum demersum. Hornwort.
Lemna oligorrhiza. Duck Weed.
Azolla rubra. Red Azolla.
Najas tenuifolia. Water Nymph.
Ottelia ovalifolia. Swamp Lily.
Trigolochin procera. Water Ribbons.
Utricularia flexuosa. Bladderwort.
Chara Benthami.
Nitella phauloteles.
Nitella diffusa.

To be added—

Myriophyllum variæfolium. Water Milfoil.
Potamogeton crispus. Curled Pondweed.
Potamogeton tricarinatus. Floating Pondweed.
Potamogeton javanicus. Small-leaved Pondweed.
Vallisneria spiralis. Eel Grass.
Nymphæa gigantea. Blue Water Lily.
Limnanthemum indicum. Fringed Water Lily.

Probably should be added—

Philydrum lanuginosum.
Typha angustifolia. Bulrush.

Phaseolus semierectus.

G.V. (Home Hill, N.Q.)—

Your speciman is *Phaseolus semierectus*, a fairly common plant in Queensland, but one for which I have not heard a common name. It is a native of tropical America, but is now widely distributed as a naturalised alien over the tropical regions of the world. It was originally introduced into Queensland as a fodder, and accounts of it abroad are rather good. Our experience here, however, on the whole, has been that cattle do not take to it when other food is available. It is a particularly valuable green manure, but the stems in older plants are rather woody for ploughing under.

Pepper Cress or "Mustard Weed."

C.McK. (Yeronga)—

Your specimen is *Lepidium ruderale*, the Pepper Cress. It is often very abundant during spring and early summer, and gives a bad "turnip" or weedy flavour to milk. In Queensland it is perhaps most commonly known as "Mustard Weed"—a name, however, applied to several plants of the same family, Cruciferæ.

Woolly Burr Trefoil.

E.R.C. (Taroom)—

The small berries attached to the branchlet of lime bush represent germinating fruits of a species of mistletoe. The little trefoil is *Medicago minima*, the Woolly Burr Trefoil; this is more abundant in New South Wales than in Queensland, and is rarely seen here. The curled pods with hooked prickles aid in the plant's dissemination. The trefoils, on the whole, are not as palatable as some of the true clovers and other herbage, but they are nutritious, and many of them fairly drought-resistant.

SHEEP AND WOOL.

Selected from the outgoing mail of the Assistant Instructor in Sheep and Wool, Mr. J. Carew.

Lung Worms in Sheep.

J. C. (Milmerran)—

The specimens of lung worms forwarded by you are the first to come under our notice in Queensland-grown sheep, a fact which we very much regret, as they are a very serious parasite in other countries. These parasites have been in evidence in New South Wales for a number of years and have been particularly troublesome in low-lying situations where the sheep drink from waterholes. We would appreciate any information regarding the possibility of how they were introduced into your flock. The lick 10 lb. salt and 1 lb. sulphur is very useful as a prevention against the development of the worm, and would be improved by the addition of 1 lb. sulphate of iron. The wet conditions during last summer were suitable for their development and spread.

Treatment.

The quickest and most reliable treatment as recommended by Major A. H. Cory, Chief Inspector of Stock, is to inject a solution directly into the trachea (windpipe). Oil of turpentine ½ drachm, carbolic acid ¼ drachm, chloroform ¼ drachm, glycerine ½ drachm. Half of these quantities for young weaners and lambs. To be thoroughly mixed together before using each dose, then slowly injected by means of a syringe into the windpipe. The needle of the syringe is inserted between the rings of the trachea about half-way down the neck. Making a small incision in the skin with a clean knife before the needle is inserted is recommended by some, but if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing, but it passes off without setting up any irritation, and is effective in destroying the worms. In bad cases it is advisable to repeat the injection on two or three occasions, allowing at least three days' interval between the injections, but in many cases one injection will be sufficient.

If it is impossible to procure a syringe or otherwise undesirable, a drench composed as follows can be given, but its action is not so effective:—

Oil of turpentine	¼ oz.
Creosote	¼ drachm.
Tincture of camphor	¼ oz.
Milk or linseed	4 to 6 oz.

This drench should be given once or twice weekly for three or four weeks. When drenching lambs give half the quantity.

Salted Sheep Food.

I.A.McD. (Longreach)—Mr. W. G. Brown, Instructor in Sheep and Wool, advises as follows:—

"The reason that cracked maize or any other concentrated foods should not be offered sheep when mixed with salt is—hungry sheep seeking food will certainly eat an excessive amount of salt in the endeavour to obtain the food, and salt in excess is poisonous. When I said in the wire that whole maize broadcast is the best way of feeding maize, I had it in mind that cracked maize is a most wasteful way of feeding sheep. Even if put in troughs, the stronger sheep will shoulder away the weaker. The lick should not be offered to sheep with maize meals, nor any other concentrated feed. In the case of the sheep that drink saline water and have saline plants and scrub for roughage, and consequently will not take salt, I believe that they will take salt if bonemeal or Naura phosphate be added. If they do, then I would advise that 5 per cent. of crude Epsom salts be mixed with the lick as well. I would recommend 40 lb. salt, 40 lb. Nauru phosphates, 20 lb. bonemeal, and positively no feed of any kind in the lick. A comparatively small amount of this lick could be offered as a trial before any serious expense is incurred."

PIG RAISING.

The following replies are selected from the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton:—

Feeding of Pigs.

Inquirer (Brisbane)—

The use of bonemeal, protein meal, meatmeal, and other mineral matters is certainly advised, for the reason that, in practically every district in this State and the other States, the soil and natural pastures and crops growing thereon are deficient in lime phosphates and other bone-forming materials and, as pigs in particular grow very rapidly and are forced on to maturity at a very early age, they rapidly outgrow their strength and put a strain on the bone-forming elements in their food which, in many instances, cannot be made up except by the addition of some concentrated readily soluble mineral matters.

Unfortunately, we have no local data to work on in regard to experiments in feeding pigs and in the use of meatmeals and other concentrates. A series of experiments was initiated on the Atherton Tableland recently in which maize, meatmeal, lucerne, and other foods were used, but the result obtained, while of value, cannot be used in publicity propaganda, unless the series is extended and carried out in other districts and on a larger scale. We strongly recommend the use of bonemeal, charcoal, wood ashes, lime water, as all these add valuable bone-forming material in readily soluble form, especially if the meals are finely ground and the lime water added to the food. We stand prepared to answer any questions in this regard not covered by the information supplied in printed form.

The pamphlet ''How to Feed and What to Feed,'' published by Thos. Borthwicks and Sons, gives details on the use of their special lines, while Denham's, Ltd., Roma Street, whose advertisement will be found in this Journal, will, no doubt, also be glad to supply further details.

It is suggested, therefore, that a typewritten list of questions be submitted dealing with these matters, when they will have prompt attention and detailed answers will be supplied.

Pig Raising in Australia.

H.G., Aberdeen, N.S.W.—

(1) Unfortunately, the average Australian farmer keeps no books or data from which could be gathered the actual cost of production of pigs, &c., hence it is difficult, if not well-nigh impossible, to determine the actual margin of profit over cost of actual production. It is generally conceded that pigs are a very profitable line of stock on our farms, and as this seems to be the experience of thousands of farmers it is accepted as a fact and used as one of the reasons why more pigs should be kept. There is little, if any, reliable data available in regard to cost of production of pigs, though odd experiments have been carried out which demonstrated that there is a sufficient margin of profit after allowing for the purchase of most of the food from sources outside the farm.

The writer has, for many years, endeavoured to have a continuous series of experiments initiated to demonstrate these and other factors in the industry but, so far, without success. Of American text-books we think the most up-to-date is the book entitled, ''Feeds and Feeding,'' by Henry and Morrison. This book can be purchased through booksellers in any part of the State.

The system of pig raising we advocate in Queensland is one in which foods such as milk and farm grain and green crops are utilised. We use the expression that ''Pig raising is essentially a farm foods and crop-growing proposition.'' It is our experience that only in this way can pigs be made to pay, for the cost of concentrated meals such as pollard is usually so high that unless they are fed in conjunction with cheaper-grown farm foods, the pork cannot be produced at a profit. We feel quite satisfied in saying that pigs can be bred and fed at a profit sufficient to cover labour and outlay on concentrates plus 75 per cent. or more of farm-grown foods.

If the pigs are to be fed on purchased concentrates alone, it is distinctly a commercial business proposition and must be treated as such in order to ensure success. This system of farming would require a much wider knowledge of foods and feeding and of general management than is possessed by most working farmers. As the business is, therefore, comparatively a risky one, we do not advocate feeding entirely on purchased foods. We shall, however, be pleased to supply further information on this point if so desired.

(2) A set of pamphlets, extracts from the "Queensland Agricultural Journal," have been forwarded. We have also posted a copy of Brünnich's "Stock Foods," and a small brochure entitled "How to Feed and What to Feed." The latter deals with proprietary made mixtures, which are well worth trial.

In the text-book "Potts on Pigs," also procurable through booksellers, will be found many references to the subject of feeding, and to experiments that were conducted at the Hawkesbury Agricultural College some years ago, with regard to the proportion of meal to use in conjunction with milk. In the pamphlet "Pigs for Profit" will be found a detailed list of foods available, with many references to their use.

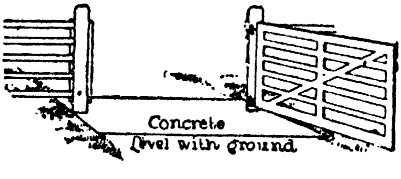
It would not be necessary, under ordinary conditions, to use more than 25 per cent. of concentrated foods, i.e., meals, the other 75 per cent. would be made up with milk, root crops, grain grown on the farm, pumpkins, &c., and green foods such as lucerne. Root crops such as Jerusalem artichokes, sweet potatoes, and small unsaleable English potatoes can be utilised to very considerable advantage, particularly in feeding young pigs.

Crops such as sorghum, cow cane, saccaline, soft varieties of sugar-cane. and grain sorghums are ideal bulky foods for breeding stock, as also are pumpkins, melons, &c., whilst good grass paddocks provide grazing which keeps breeding stock occupied, giving them a good "filler," satisfying them, and incidentally providing them with a good variety and cheapening cost of production of their progeny.

It is quite erroneous to suggest that milk is the only satisfactory food for pigs, as many thousands of pigs are produced annually in Australia and in other parts of the world that have no milk at all after weaning. The various other foods referred to, plus others mentioned in the pamphlet "Pigs for Profit," provide quite an extensive list of foods all well worth trial.

CONCRETE GATE ENTRANCE.

The space underneath the gate at the entrance to the barnyard is very apt to be a mudhole in bad weather. The sketch shows how I converted the mudhole under my gate into a dry, concrete walk. I dug out the space between the gate posts about 2 or 3 feet on either side of the gate. This excavation was 4 inches deep. I filled this with concrete to a height of about 3 inches above the ground at the edges of the excavation. This eliminated the mudhole permanently. Four or five bags of cement will do the work.



"EVERY FARMER SHOULD SUBSCRIBE!"

A Mutdapilly correspondent: "Must congratulate you on such a valuable Journal. I think every farmer should subscribe to it."

THE METHYLENE BLUE TEST AND CURD TEST.

When a cheesemaker is troubled with fermentation (gas), bad flavours, or low-grade product, he can locate the source of his trouble by applying the methylene blue and curd test to each patron's milk supply, and obtain information that will materially assist him in carrying out his work. The methylene blue test was dealt with in the April issue of this Journal.

In carrying out the curd test the samples of milk submitted to the methylene blue test is held at a temperature of 98 to 100 deg. Fahr. until it coagulates. When the coagulation is firm it is cut into small pieces with a sterilised blade. Draw off the whey at intervals and allow the curd to mat. Hold the matted curd at a temperature of 98 to 100 deg. Fahr. for about twelve hours. In ten to twelve hours the curd should be finally examined.

The quality of the curd in conjunction with the methylene blue test determinations will enable the milk grader to classify the milk supply from each dairy farm, and will be indicative of the care given to the production and handling of the milk on the farm.

Regular periodic applications of these tests to milk supplies will generally determine the conditions pertaining to the production and handling of each milk supply. All low-grade milk can be detected, and the industry will benefit by the carrying out of the tests by milk-grading officers.

Cheesemakers are familiar with the characteristics of the curd produced from first-quality milk.

Inferior low-grade milk would be indicated by one or more of the characteristics, as stated hereunder:—

Character of Curd.	Class Bacteria present.	Indicative of Methods of Production.
Even, smooth, no gas holes, pleasant acid odour	Lactic acid producers	Sanitary
Slight gas holes	Lactic acid producers and gas-producing organisms	Doubtful
Gas holes prevalent	Gas-producing organisms predominate	Careless
Portion curd liquifies, odour disageeable	Peptonising organisms	Unclean and insanitary generally

Some of the common sources of milk infection by undesirable micro-organisms, including gas forming, are—

(*a*) Unclean milking;

(*b*) Moistening the milkers' hands by drawing milk from the teat on to the hands;

(*c*) Dirt with adhering micro-organisms from the cow's body falling into the milk;

(*d*) Allowing the dairy cows to have access to impure drinking water, or allowing them to wade in stagnant water and bogs;

(*e*) Feeding mouldy or decaying fodder to dairy cows;

(*f*) Using the milk of unhealthy cows (inflamed udders, &c.);

(*g*) Neglecting to cool the milk as soon as it is drawn from the cow;

(*h*) Cooling in and exposing the milk to impure air, especially air charged with manure in the form of dust, carrying countless bacteria; also dust from hay and fodder;

(*i*) Neglecting to strain the milk in an approved manner by passing it through a sterilised cotton wad;

(*j*) The use of unclean unsterilised dairy utensils and machinery; and

(*k*) Drawing whey and milk in the same cans without thoroughly washing and sterilising before the milk is placed in them.

ADVICE TO CREAM PRODUCERS.

The following is brought to your notice with the desire to point out clearly the defects that arise in cream, and to offer suggestions for remedying such defects so that the quality of the product may attain a high standard to the mutual benefit of the producer and the factory management. If the quality of the cream does not reach an A1 standard after you have given the abovementioned matters your attention, ask the assistance of the local Dairy Inspector—he will advise and help you:—

Defects.	Prevention.
I.—Cowy ..	Keep milking-sheds clean. Remove manure from shed daily. Remove milk to separating-room immediately after milking. Store cream in clean surroundings.
II.—Food Flavours, Weedy	Do not feed high-flavoured foods immediately before or at time of milking. Milking cows should not have access to paddocks where carrot-weed, wire-weed, stinking-roger, and such like are growing. Musty inferior hay and silage should not be fed to dairy stock.
III.—Overripe, Stale, Rancid	(*a*) Cool cream as low as possible immediately after separating. Do not mix warm and cool cream together. Stir cream occasionally, using a tinned steel stirer (do not use a wooden stirer). (*b*) Deliver regularly to factory. Scald all utensils. Separate a cream with a butter-fat content of not less than 38 per cent. from October to March, and not less than 34 per cent. from April to September.
IV.—Curdy ..	Read No. 3 (*a*) prevention carefully.
V.—Fermented, Yeasty	Wash and dry cows' udders and teats before milking. Strain milk immediately after milking. Do not use rusty utensils. Do not allow cows to drink or wade in stagnant water or bogs. Remove skim milk from dairy on completion of work. Protect milk and cream from dust and flies. Read No. 3 prevention carefully.
VI.—Unclean ..	Do not use milk of newly-calved cows until seven days after calving, or from cows suffering from inflamed udders, or from other unhealthy cows. Watch carefully for mammitis, and report any suspicious case to Chief Inspector of Stock, who will advise in regard to treatment.
VII.—Ropey ..	Keep stock away from stagnant or bad water. Thoroughly clean and scald all dairy utensils. Do not use milk from unhealthy cows.
VIII.—Tallowy ..	Do not expose milk or cream to high temperatures or direct rays of the sun. Keep cream as cool as possible.
IX.—Absorbed Flavours and Odours	Do not allow milk or cream to come in contact with the odour of paint, disinfectants, engine oil, vegetables, fruit, &c. Smoking should be prohibited in the vicinity of the milking-shed and dairy house.
X.—Mould ..	Do not keep cream in an old wooden building without thoroughly limewashing walls and ceiling. Do not store bags, clothing, or articles other than dairy utensils in the dairy or cream room.

"NO FARMER SHOULD BE WITHOUT THE JOURNAL."

Thus a Warwick farmer (23rd August, 1927): "I am enclosing order form for the Journal, which I consider no farmer should be without. . . ."

General Notes.

Identification of Stock.

A Regulation has been approved under the Diseases in Stock Act giving an Inspector authority, if desired in special cases, to brand with a paint brand cattle that have been dipped.

Arrowroot Board.

A Regulation has been approved under the Primary Producers' Organisation and Marketing Act, requiring millers of arrowroot to forward to the Arrowroot Board weekly returns setting out the amount of arrowroot bulbs received and stock of bulbs and flour on hand.

Banana Levy Regulations.

These Regulations, approved under the Fruit Marketing Organisation Acts, provide for a levy at the rate of ½d. per every £2 worth of bananas sold in Queensland from 9th September, 1927, to 31st December, 1929. Before such levy can be made, however, a resolution must be passed by the Committee of Direction to that effect and notice of intention to collect the levy advertised. The levy will be collected by agents selling bananas and will be paid by means of levy stamps. Provision is made for growers who sell bananas privately to pay the levy direct to the Committee of Direction. The levy will be used solely in the interests of the banana industry. A penalty of £20 is provided for a breach of the Regulation.

Staff Changes and Appointments.

The appointment of Mr. S. M. Seumer as Inspector of Stock has been confirmed as from the 3rd February, 1927.

Constable J. M. Lyons, Windorah, has been appointed Inspector of Brands.

The following transfers of Slaughtering Inspectors have been approved:—T. E. Tuck, from Brisbane to Coolangatta; A. E. Mitchell, from Rockhampton to Brisbane; G. A. Smith, from Charters Towers to Rockhampton; and Mr. H. F. Sibley, of Goomeri, has been appointed Inspector of Slaughter-houses, on probation.

Mr. P. J. Short has been appointed Temporary Inspector of Stock and Slaughter-houses at Coolangatta.

Mr. J. A. McNicol, of "Wattle Camp," *viâ* Nanango, has been appointed Honorary Inspector under and for the purposes of the Animals and Birds Acts.

Mr. L. L. Gudge, Cotton Classer, has been appointed Cotton Classer and Salesman, Department of Agriculture and Stock.

Levies under the Marketing Act.

Regulations under the Primary Producers' Organisation and Marketing Act have been approved for the following purposes:—

(*a*) Empowering the Mossman Mill Suppliers' Committee to impose a levy on canegrowers in the Mossman district at the rate of 4d. per ton of cane delivered to the Mossman Mill during the 1927 season. The proceeds of this levy, if made, shall be utilised for administrative purposes in connection with the conduct of an office and payment of a secretary and paymaster for the harvesting of the cane of suppliers to the mill. Provision is made for the taking of a poll on the question of the levy, if same is demanded by at least seventy suppliers to the mill. Such request for a poll must be received by the Minister not later than 27th September, 1927.

(*b*) Empowering the Cotton Board to make a levy of one-eighth of a penny per pound on all cotton produced between the 1st January, 1927, and 31st December, 1931. This levy is to be paid into a capital fund to be expended in effecting any object which, in the opinion of the Cotton Board, is in the interests of cotton-growers. Provision is made for a poll to be demanded before 3rd October, 1927.

(*c*) Amending Regulation 175, published in the "Government Gazette" of the 30th July, 1927, providing for the making of levies by Hambledon, Pleystowe, and Tully Sugar Mill Suppliers' Committees. The Regulations originally provided for the levies to be deducted from the final cane payments due to growers by the respective mills, but the word "final" has now been omitted as the Canegrowers' Council desires the levies to be collected monthly.

Sanctuaries under Animals and Birds Acts.

The following have been approved as Sanctuaries for animals and birds:—Property of W. J. Martyr, Taroom; Canning Downs, property of J. H. S. Barnes; Timber Reserve No. 97, on the eastern fall of Eungella Range, Mackay; properties of J. A. McNicol, C. S. McClymont, G. Stegeman, and Mrs. E. E. Toop, of the Nanango district.

Peanut Board Election.

Following is the result of the annual election of Growers' Representatives to the Peanut Board:—

District No. 1 (Wienholt and Nanango)—

Charles Frederick Aderman (Wooroolin)	121 votes
Malcolm Redman (Crawford)	87 „
John Coe (Memerambi)	85 „
John Wesley Johnston (Wooroolin)	63 „

District No. 2 (Central District)—
Alfred Skinner Clark (Sandhills) returned unopposed.

District No. 3 (Rest of Queensland)—
Richard Major Wise (Buderim) returned unopposed.

Messrs. Aderman, Redman, Clark, and Wise are accordingly elected. Three of these gentlemen were members of the old Board, and Mr. Redman takes the place of Mr. Muir, who is now the manager of the Peanut Pool.

Wheat Board Election.

Following is the result of the annual election of Growers' Representatives to the State Wheat Board:—

District No. 1 (Dalby, Maranoa, Nanango, &c.)—
Robert Swan (Wallumbilla) returned unopposed.

District No. 2 (Electorate of Pittsworth)—
Arthur Carl Krieg (Brookstead) returned unopposed.

District No. 3 (Warwick, Killarney, &c.)—

Bergittinus C. Kirkegaard (Freestone)	330 votes
Alexander N. Allen (Campbell's Plains)	75 „

District No. 4 (Cunningham, &c.)—
Thomas Muir (Allora) returned unopposed.

District No. 5 (Toowoomba, Lockyer, &c.)—

John Archibald (Oakey)	152 „
Patrick McNee (Kingsthorpe)	121 „

One representative is required for each district. Messrs. Swan, Krieg, Kirkegaard, Muir, and Archibald, who were retiring members of the Board, are accordingly re-elected.

Atherton Tableland Maize Board Election.

The election of Growers' Representatives to the Atherton Tableland Maize Board took place recently at Atherton, and was presided over by Mr. A. H. Jones, of the Department of Agriculture and Stock, Brisbane, as Returning Officer. Following are the results:—

Lyall Reginald Crouch (Atherton)	208 votes
Harold Henry Collins (Atherton)	187 „
George Douglas Howe (Tolga)	185 „
George Charles Finch (Atherton)	178 „
Vincent Patrick Higgins (Kairi)	173 „
Harold Walker Hallett (Peeramon)	169 „
James Joseph McDonald (Tolga)	161 „
James Paul McCarthy (Tolga)	157 „
John Gargan (Atherton)	148 „
Neil Neilson (Kairi)	126 „
Mark Sims (Atherton)	55 „

Five members were required, and Messrs. Crouch, Collins, Howe, Finch, and Higgins were accordingly elected. Of these, Messrs. Collins and Crouch were retiring members.

These members will hold office from 1st September, 1927, to 31st March, 1929.

Furniture from Queensland Timbers.

Queensland farmers are familiar with many of the fine timbers grown in their State, and of special interest to them is the manufacture of beautiful furniture from these timbers. Messrs. John Hicks and Company, Limited, have been associated with furniture and furnishings for over half a century, and to-day, the "Hixco" factory is the largest furniture factory attached to a retail furniture warehouse in Queensland. In fact, it is considered that few others are larger than it in any part of Australia. The "Hixco" idea is to serve, not to sell, and these rooms show how it is possible to furnish a home tastefully and inexpensively without cramming it full of furniture. Some conception of the amount of work provided for Queenslanders, both in the city and country, by the manufacture in Queensland of furniture from Queensland-grown timbers, may be obtained from a visit to the "Hixco" warehouse in Brisbane.

How the Public Curator Serves the People.

In standing by the principle of Queensland Preference on the grounds that "The love of country prevails," you are asked to advocate the use of Queensland goods and articles, to favour the employment of Queenslanders, and to uphold the interests generally of this great State.

To take this great principle of preference a step further, you are asked to use your own State institutions, of which the office of the Public Curator of Queensland is one.

In appointing the Public Curator your Executor and Trustee, you have behind you the guarantee of the State, which, in effect, means the assurance that your estate, when you have passed away, will be safely and honestly administered in the very best interests of your beneficiaries.

Furthermore, in appointing the Public Curator your Executor or Administrator you have the added assurance of a permanent trustee; that is, one who, by virtue of his office, never dies, and one who, moreover, never goes insolvent and never absconds with the moneys that rightfully belong to your dependents. Then, again, to the shares of all infants held until they attain their majority, the Public Curator adds 5 per cent. per annum interest. What other Trustee in Australia, let alone Queensland, acts so liberally? Not one. Private Trustees usually place the shares of infants in the Savings Bank, where interest at the rate of 3½ per cent. only is added. Is not 5 per cent. better than 3½ per cent.?

A Safe Investment for Your Moneys.—The Public Curator is also prepared to receive from you for investment on fixed deposit sums of £100, or more, for twelve months or longer, on which interest at the rate of five (5) per cent. per annum will be paid to you every three months, without any costs or deductions. All investments of this nature are guaranteed by the State, so that there is no risk of any loss.

Steady Growth.—The steady growth of the Public Curator Office is being well maintained. At the end of the financial year, 30th June, 1927, the "Profit and Loss Account" showed a profit of £6,094. The total profits—carried to a reserve fund—since the inauguration of the office in 1916, now reach the respectable sum of £49,000, notwithstanding the fact that the charges of the office for work performed have been reduced from time to time, so that they are now the lowest in the Commonwealth for carrying out the duties of Administrator, Executor, or Trustee.

Wills Made Free of Any Charge.—You are invited to consult the Public Curator in regard to making your will, because it is dangerous to have a will drawn up by an inexperienced person, as legal complications are likely to arise which, invariably, can only be settled by the Supreme Court at great expense to the estate.

Income Tax Returns.—Who is not considerably worried every year in the making out of Income Tax Returns? The Public Curator has an expert staff who is prepared, for a small charge, to prepare your returns for you. You have only to read the daily papers to learn how many people are prosecuted every year for either failing to send in to the Commissioner Income Tax Returns or for sending in incorrect returns.

Home Builders and Home Seekers.—The Public Curator is also prepared to assist people to build or buy homes up to 60 per cent. of the value of the land and improvements. For example: If you desire to purchase a home for £1,000 the Public Curator will advance £600 towards the purchase, and take a first mortgage at 7 per cent. per annum as security for the £600.

The Public Curator has now Branch Offices at Rockhampton, Townsville, and Cairns.

Oil Prospects.

The geological adviser to the Commonwealth Government (Dr. Woolnough), who recently returned from an examination of the various areas in the interior of Australia in search of oil-bearing country, says that there is every reasonable chance of oil being found, provided the search is carried out on proper scientific lines.

The Commonwealth Government proposes to have an oil survey made of New Guinea and Papua, and the preliminary work will be carried out by aeroplanes. Dr. Woolnough left for Papua on 17th September.

The Minister for Home and Territories (Mr. Marr) is taking a keen interest in the search for oil, and he said recently that two of the Australian Air Force 'planes would leave almost immediately. The officers in charge of the 'planes would prepare a base map for the geologists. Reports from the Roma oil bore are distinctly encouraging. A strong gas flow has been tapped with a pressure up to 375 lb. From the gas petrol has been extracted, and generally oil prospects in Queensland are at present very promising.

The Value of Wheat-breeding.

Canada is now the third largest wheat-producing country in the world. This achievement is directly due to the experimental work in wheat-breeding carried out at the experiment stations. Up to the end of last century certain strains of wheat, such as Red Fife and Huron, were grown successfully in the Eastern Provinces. But the shorter growing period and the early frosts of the North and West prevented successful production in these vast regions.

A writer in the "Scottish Journal of Agriculture" relates that Dr. Saunders and his associates, by breeding and selection, produced a strain which ripens about a week earlier than the Red Fife, and which has a strong straw and a non-shattering head, which are obviously valuable characteristics for the great wind-swept plains. This strain, known as Marquis wheat, made wheatgrowing possible for the whole of the Western Provinces, and considerably extended the Northern limits of successful wheat production. To-day it is estimated that 95 per cent. of Canada's wheat areas is in these prairie provinces. It is very interesting to note that 90 per cent. of the total wheat yield of the Western Provinces is developed from the single seed of Marquis wheat discovered in 1903. It is estimated that Marquis wheat has increased the earning power of Canadian farmers by at least 20,000,000 dollars per annum.

The wheatgrowers of Australia owe, relatively, quite as much to the plant breeder. Indeed it is possible that the debt is even greater here, for breeding and selection have produced a number of varieties suited to a great variety of conditions, and have thus added incalculably to the security of wheatgrowing in the Commonwealth.

Distinguished Visitor's Pleasant Memories of Queensland.

The Diwan Rangachariar, who represented the Government of India at the opening of the Federal Parliament House at Canberra, writing to the Editor of this Journal, from "Ritherdon House," Vepery, Madras, India, says:—Myself and my two sons returned home on the 17th July. We had a very rough voyage for the first two days after we left Fremantle. The Orient Line steamer "Orvieto" responded beautifully to the pitch and toss she was subjected to. We landed in Colombo on the 14th July. It was a very good and pleasant company we had on board. My family members are all doing very well and our home-coming was duly celebrated by the boys and girls. I had a grand reception at Colombo and again here in Madras. I gave an address at Colombo under auspices of the Y.M.C.A. to a very large audience. The subject was "Democracy in the East." I gave two or three interviews. I am already booked here for several speeches—"Life in Australia," "Life, Urban and Rural, in Australia," "The activities of the young in Australia," "The Citizen in Australia" are so far booked under the auspices of several associations.

We had a very pleasant time of it there. Thanks to your splendid hospitality, I learnt many things about your country and your people. I am looking forward to renewing my acquaintance with you all and your country at no distant date.

I thank you one and all for all that you did to make our stay agreeable and instructive. I trust India will find a warm corner in your hearts and a close union between the two great countries will soon be effected.

I am looking forward to your visit to our country and you may count on my humble assistance to make your tour here enjoyable.—Yours sincerely, D. RANGACHARIAR.

Royal Society of Queensland.

The Ordinary Monthly Meeting of the Society was held in the Geology Lecture Theatre on Monday, 29th August, 1927.

The President, Professor E. J. Goddard, was in the chair.

The President called for nominations for three trustees of the Society, and on the motion of Professor H. C. Richards, seconded by Dr. E. O. Marks, it was decided to ask Mr. F. Bennett, Mr. J. B. Henderson, and Dr. A. Jefferis Turner to accept the positions.

Messrs. A. M. Epps and L. Franzen were nominated for ordinary membership of the Society.

Dr. F. W. Whitehouse exhibited (*a*) goniatites, probably belonging to the genus *Eumorphoceras*, from the Rockhampton Series at the 2-mile tunnel on the Many Peaks-Monto Railway. These appear to represent an horizon about the very base of the Upper Carboniferous; and (*b*) rolled Devonian pebbles containing *Spongophyllum halysitoides* from the lower limestone in the carboniferous beds near Mount Lion (Central Queensland).

Dr. W. H. Bryan exhibited specimens of a non-calcereous oolite from the north bank of the Pine River, about three miles from its mouth.

Professor E. J. Goddard exhibited a live specimen of a new species of *Peripatus* collected on Dunk Island, North Queensland, by Mr. W. Cottrell Dormer during the University biological excursion in the latter part of August.

A lecture entitled "Giants of the Past," illustrated with specimens and lantern slides, was given by Mr. Heber A. Longman, F.L.S., C.M.Z.S. The principal vertebrate fossils found in Queensland deposits were concisely dealt with, prominence being given to the large marsupial cranium from Brigalow, Darling Downs, described as *Euryzygoma dunense*, and to the giant Dinosaur *Rhoetosaurus brownei*. An outline was given of the classification of the many families of Dinosaurs, and the lecturer stated that recent intensive studies of comparative anatomy had greatly enlarged our knowledge of extinct as well as living vertebrates.

Manurial Trials with Broom Millet.

A number of broom billet experiments were arranged around Coraki on the Richmond River (N.S.W.) last season, but seasonal conditions were so adverse that the plots were either failures or valueless for comparative purposes.

At Tatham, via Casino, Mr. J. P. McDonnell was somewhat more fortunate as regards situation and weather at harvesting time. The soil is a heavy black alluvial which had been previously cropped with maize and ploughed in August and September. Thorough cultivation was then given in preparation of the seed-bed for planting. However, the weather remaining dry, planting was not carried out until 24th December. An excellent germination was obtained, and the cultivators were kept moving during the early stages of growth.

The rainfall during the growing period was as follows:—January, 1,320 points; February, 441; March, 408; April, 285; total, 2,454 points.

The results obtained were as follows:—

	cwt.	qr.	lb.
Superphosphate, 2 cwt. per acre at planting, and top-dressed with ¾ cwt. nitrate of soda just before the head appeared	9	0	4
Superphosphate, 2 cwt. per acre at planting	7	3	1
No manure	6	3	25

The plots manured with superphosphate at planting were more vigorous and of a healthier and darker green than the unmanured plot. The top-dressing with nitrate of soda just before heading had the effect of forcing the heads out quickly; they were half out on this plot before the heads on the other plots commenced to appear.

The results are of great significance to the mill-growing of the State, for only a few at present use fertilisers. The top-dressing at heading stage with a gentle-acting nitrogenous fertiliser, such as nitrate of soda or sulphate of ammonia, not only markedly increases the yield, but is likely also to much improve the quality in two ways: (1) by forcing the heads out quickly and thus reducing the amount of bent brush, and (2) the rapid exsertion of the brush from the leaf sheath deprives aphis of shelter, and thus ensures greater freedom from the discolouration caused by those insects.—M. J. E. Squire, Agricultural Instructor, in "Agricultural Gazette," N.S.W.

Gidyea for Sheep.

Gidyea, by some, is regarded as harmful only when in green pod; the pods possess a saponin, which so far has not been found in the leaves (phyllodes). Some of the saponins are known to be poisonous, but the whole question is one that is worthy of the fullest investigation both by means of feeding experiments and chemical analysis.

Personally, I think that Gidyea can be used safely when in leaf only, but this is only a belief and is not backed by any scientific evidence.

We have no chemical analysis of Gidyea to show how it compares with Mulga in nutritive value.—C. T. WHITE, Government Botanist.

Increasing Milk Production.

According to the Department of Agriculture, U.S.A., the "Milk-for-Health" campaign has increased the consumption of milk in the United States approximately 27 per cent. in the eight years for which results have been checked.

As the result of more than sixty separate drives in which the Department assisted in 1918-1925, an average reduction of 12 per cent. in under-nourishment among school children has been accomplished.

The report states that many cities and rural communities have found that there is a relatively high percentage of under-nourishment among children, and that this condition frequently accompanies a low average per capita consumption of milk. Experience has shown that this failure to use an abundant supply of milk cannot be attributed wholly to a lack of material wealth, but rather to a lack of information regarding the importance of milk in the normal development of the growing child.

In 1918 the United States Department of Agriculture formulated a plan for carrying on milk-for-health campaigns. A definite arrangement was made for co-operation with the extension service of the State agricultural colleges, and early in 1919 the first milk-for-health campaign was conducted in one of the New England States. This was followed by similar work in near-by States. Gradually the idea spread, and campaigns of this kind have been conducted in over thirty States.

The result of these conbined efforts is a 27 per cent. increase in consumption of milk in the States since 1918, and an average of 12 per cent. reduction in under-nourishment among school children has been effected in those communities in which comparisons could be made, while the increase in milk consumption has ranged from 10 to 30 per cent.

Fertiliser Trial with Tomatoes.

A fertiliser trial with tomatoes was conducted by Mr. R. D. Westmore at Farm No. 971, Griffith (N.S.W.) during 1926-1927 season. Plots of one-fourteenth acre each were planted on 11th December, 1926, each plot containing an equal area of Red Stone and San Jose varieties. They were planted in well-prepared land which had previously grown a crop of peas that had been ploughed in in July, 1926. The harvesting of the tomatoes commenced on 7th March and continued until 6th May.

The fertilisers used and the yield obtained were as follows:—

	Yield per Acre.			
	t.	cwt.	qr.	lb.
No manure	3	8	1	0
Superphosphate, 2½ cwt. per acre	3	15	1	0
P7, 2¼ cwt. per acre	4	4	1	0
P1, 2 cwt. 3 qr. 14 lb. per acre	4	0	2	0
P10, 3¼ cwt. per acre	3	15	2	0
Basic superphosphate, 3 cwt. per acre	3	11	3	0
Superphosphate, 2¼ cwt., with sulphate of ammonia, 1 cwt., top-dressed	3	16	0	14

The composition of the mixed fertilisers was as follows:—P7 equal parts of superphosphate and bone dust: P10, 10 parts superphosphate, 1½ parts of sulphate of ammonia, and 1½ parts of sulphate of potash; P1, 10 parts superphosphate and 1½ parts sulphate of ammonia.

The season was not a particularly good one for tomatoes, and the yields were only fair and scarcely payable. Apart from lack of rainfall, the atmosphere conditions did not favour production of thrifty and healthy vines.

The increases obtained from fertilisers were not great, but on local factory prices of £6 per ton, P7 gave an increased gross return of £4 16s., and P1, £3 15s. per acre. Deducting the costs of these two fertilisers, the net monetary improvement from the use of P7 was £4 0s. 3d., and from P1, £2 15s. per acre.

The increase obtained by top-dressing hardly justified that practice.—E. B. FURBY, Agricultural Instructor, in the "Agricultural Gazette," N.S.W.

The Home and the Garden.

JAM AND JELLY MAKING.

MARGARET A. WYLIE, Inspector and Organiser of Domestic Science, Education Department, Western Australia.*

At this season of the year, when fruit is abundant, a few directions on the making of jam and jelly should not be amiss.

Floating about in the air, unseen to the naked eye, are tiny organisms which have power to reproduce their kind. These are of numerous varieties: some consist of minute plant life, the spores of which seem to be just waiting for soil suitable to their growth, where they become visible in forms such as moulds and yeast; others known as bacteria are micro-organisms which form masses or colonies, and cannot be seen except with a microscope.

The processes of jam making and fruit preserving cannot be adequately dealt with unless the action of these be considered, as they are the chief causes of fermentation. Another class of ferment which should be mentioned are enzymes. These are the natural ferments found inside fruits, vegetables, and grains, and which in the course of development break down cell walls which enclose them, giving rise to gases which spoil the fibre of the fruit and cause decomposition.

Moulds, of grey or brownish colour, are seen on decaying fruit. As a rule they thrive in dark damp places where there is little or no circulation of air. They grow rapidly and change in colour as they get older. Their necessary foods are sugar and starch. The spores of these moulds drop from the plant on to exposed food, and immediately grow and send down roots into this food soil. This may be seen in the quick decomposition of stewed fruit, which is only partially preserved with but a small percentage of sugar, and cooking only sufficient to break down the fibre. Consequently a short time sees acid fermentation begin, gases being generated and given off and mould forming. Much the same thing happens in the case of jam and jelly when its manufacture has been carried out in a haphazard fashion.

The Fruit.

This should be suitable, and at that stage of ripeness when it contains most pectin. Pectin is fruit jelly, and is found in just under-ripe fruit in larger quantities than at any other time. This substance enables jam to "jell." Fruit, therefore, should be jelly ripe for jam and jelly if the best results are to be achieved. By "unripe" is meant that stage when fruit is coloured and firm, yet not ready for eating. In over-ripe fruit sugar preponderates. When fruit is ripening pectin is converted into sugar. Jams and jellies made with fruit that has been plucked a long time or is very over-ripe will candy or ferment and turn mouldy. Sometimes it is necessary to add a little citric acid to draw out the pectin and hasten the "jell" point.

In up-to-date factories a jellometer is used to determine the amount of pectin in the juice; also a saccharometer to determine the amount of sugar present. The usual mistake in jelly making is the addition of too much sugar, the result being a syrup instead of a "jell."

Almost any variety of fruit is suitable for jam making, though some are preferable to others. With few exceptions fruits are treated in the same way. Oranges and lemons, on account of their jellying properties, will stand a large addition of water. Mulberries, lacking in pectin, will not jell unless other fruit, strong in acids, such as apples and lemons, are added to them. A frequent cause of failure is the use of damaged fruit. It is often too sweet and has lost its true flavour.

Sugar.

The part that sugar plays in jam and jelly making is that of a preservative. Excessive sugar will not cause mould, but excess of sugar takes from the quality of the article in respect to flavour and appearance. Each variety of fruit has its distinctive flavour and colour, more or less delicate and delicious. Every care should be taken to preserve these. For household purposes ¾ lb. of sugar to 1 lb. of prepared fruit for jam is a good formula; for jelly one cup of sugar to one cup of strained liquid. Circumstances alter cases, however, and if the housekeeper wishes to excel, she should use her powers of observation and keep notes from time to time for future reference. The best granulated sugar should be used, and damp dark sugar strictly avoided.

---

* In the "Journal of Agriculture," W.A.

Method for Jams.

The methods of making the different types of jams vary very little. As a general rule the addition of a little water to the fruit adds to its clearness, and prevents burning before the juices commence to flow. It is possible, but not easy to make jams without a proper preserving pan. Iron pans should never be used, as they spoil the colour and flavour. Strong enamel iron pans are best, and with care will last a lifetime. These should be fairly shallow to assist speed in boiling. A large wooden spoon (or child's wooden spade for preference) should be used for stirring. Jam jars should be in readiness; glass jars have replaced the delf of olden times. Glass bottles are cheaper than jars, but for convenience sake should have wide necks. The receptacles should be clean and dry. Just before using they should be heated, not only to prevent the hot jam from cracking them, but also to dry off any moist air in the jar or bottle. Coverings of white paper and labels should also be in readiness. Avoid use of tin lids unless the proper and complete process of sterilisation is carried out. The preparation of fruit is of importance, and differs according to the variety. If freshly picked, the bloom should be rubbed off. Plums, nectarines, and peaches should be cut in two, and the stones removed. Crack quarter of the stones of nectarines and peaches, and cook the kernels with the fruit.

General recipe for making stone and berry fruit jam:—

Ingredients—

6 lb. of prepared fruit.
4½ lb. of sugar.
A little water (about a pint).

Method—

Boil fruit and water until the fruit is soft.
Gradually add sugar, stir frequently, and boil until "jell" point is is reached.
Bottle while hot.
Cover when cold.

When stirring cannot be carried out regularly, it is advisable to have a sheet of asbestos under the pan to prevent the preserve burning, but it should be borne in mind that the quicker the process is carried out the better will be the appearance of the completed product, and the more bright and sparkling it will be. Over-boiling weakens it, and in the end destroys the jellying properties of the fruit, and the jam often becomes sticky and viscous. To test for the jell point put a small quantity (one teaspoonful) in a saucer and place in a draught of air. If it completely sets the jell point is reached, and the jam is then ready for bottling.

Jelly Making.

To be brief, the aim is to get jelly with both good colour and flavour, as well as a clear and sparkling appearance. When slipped out of the glass it should retain its form and cut clean with a knife. It is often thought that only apples, quinces, and citrus fruits are suitable for jelly making, but as a matter of fact English gooseberries, Cape gooseberries, grapes, passion fruit, and melons make excellent jellies. The same degree of ripeness of the fruit should be observed as in jam.

Cleanliness and care are indispensable. The fruit should be clean, and all utensils and cloths scrupulously so.

Directions—

(1) Wash fruit, cut apples and quinces into four or six pieces without removing skins. Grape and berry fruits crush a little.
(2) Put fruit in preserving pan with sufficient cold water to cover well.
(3) Bring to boiling point and boil gently until fruit is soft, stirring occasionally.
(4) Pour into a jelly bag and allow to drip. Do not disturb the pulp. It is advantageous to strain the liquid a second time, pouring it through the pulp.
(5) Measure strained liquid.
(6) Place again in pan, bring to boiling point and add sugar (one cup of sugar to one cup of liquid).
(7) Boil quickly till it jells (about 20 minutes).
(8) Remove any scum before potting.

Note.—A chair turned upside down on the table may be used as a frame for the straining process. Fasten a clean tea-towel by its corners to the ends of the legs, allowing it to sag a little. Place a basin underneath to catch the fruit juice.

STORY OF THE GARDEN.

PURPOSE OF THE FLOWER.

By E. FITCH DAGLISH, Ph.D.*

So used are we to seeing gardens gaily decked for a great part of every year with a multitude of smiling blossoms that it is almost impossible for us to visualise an entirely flowerless world. Yet there were not always flowers. For countless millions of years vegetation on this earth consisted only of monster ferns, growing to the size of trees, pines, huge club mosses, gigantic horse-tails. Only when the lower layers of what now form the chalk cliffs and hills were being formed beneath the sea—something like 12,000,000 years ago—did flowers, or rather flowering trees, begin to brighten the gloom of those great forests represented nowadays by our deposits of coal. From that ancient time, however, flowering plants have ever continued to advance in type and multiply in variety.

The earliest flowers depended on the wind for pollination. They were small, green, and unattractive, similar in many respects to the inconspicuous flowers of our present-day catkin-bearing trees. When pollen is carried by the wind, the chance against any given grain of this dust being blown on to the stigma of a flower of the same kind is very remote, and a great waste of pollen is inevitable. This necessitates the manufacture of enormous quantities of pollen in order to ensure that a sufficient number of seeds be set by the plant concerned to perpetuate the species.

At the time these wind-pollinated plants represented the "last word" in vegetation insects of various kinds, including short-tongued flies and beetles, had made their appearance on the earth and to these pollen naturally offered an easily obtainable source of food. But even more appreciated would be the drops of sweet-tasting fluid which were to be found on some of the plants. Originally this syrup was doubtless secreted as a waste product, indifferently on the leaves and in the neighbourhood of the flowers, but, where it occurred in the latter position, to get at it the insects would often have to come into contact with the pollen and thus become dusted with this material.

Pollen Carriers.

In this way these early nectar seekers became the pioneers in the traffic in pollen, which has exerted such an important influence on the development of both flower and insect types. Individual plants having a tendency to secrete the nectar-like fluid near the flowers would obviously obtain an advantage over those of their neighbours in which the waste product was given off on the leaves or other parts, and could stand a better chance of setting large numbers of seeds. Those of their offspring which inherited this peculiarity would in turn benefit, and in course of time this advantage, in face of the excessively severe competition or struggle for life found throughout the plant world, might well give rise to a breed in which the secretion of sweet liquid in the flowers was a well-marked characteristic.

The blossoms of the ivy furnish a good example of the kind of flower which would be formed in this way. Here the nectar is freely exposed in the small blooms, and may easily be reached by all sorts of short-tongued insects. But although this represents an obvious advance on such flowers as those of the hazel, which still depend solely on the wind for the setting of their seeds, it is by no mean devoid of defects. The fact that the nectar stores are easily reached is in itself a drawback for many tiny, crawling creatures may avail themselves of the sweets provided without conferring any sort of benefit on the plant which thus entertains them. Further, this type of blossom is very liable to damage by rain and is not conspicuous enough to attract large and busy insects.

Let us consider now how the form of the ivy flower could be improved so that all the drawbacks mentioned might be removed. First, it is necessary to devise some means of excluding all but those insects of such size and shape as may serve as pollen carriers. This is not so easy a matter as might at first be supposed, for most of the devices which will effectually keep out useless visitors from the nectar will operate also against those whose visits are particularly required. Next, the store of syrupy liquid must be protected from being damaged by rain, and, finally, the flowers need to be made more attractive and conspicuous in order that flying insects may be made aware of their position.

The buttercup will serve as an example of a plant which has produced flowers answering to all the requirements named while still retaining a comparatively simple structure. Here the nectaries are protected by a scale, and are so placed that the nectar may be obtained only by insects possessing tongues at least ⅜ in. in length. Thus all very tiny insects are prevented from stealing the sweet bait, while visitors whose bodily structure enables them to reach the desired food can hardly help rubbing their bodies against the plants' stamens and stigmas and thus bringing about fertilization of the flowers.

---

* Reprinted from "Brisbane Sunday Mail."

The Flower and its Make-up.

Before proceeding further to consider the meaning underlying the many different shapes presented by flowers, it may be well to pause to examine the various parts which go to make up a flower. Most conspicuous is the coloured part, or corolla, which is made up of a number of parts, either separate or partly or wholly fused together and called petals. Beneath this is a cup-like part called the calyx, consisting of several sepals. This latter portion entirely surrounds the base of the corolla, and is usually green in colour. Within the space enclosed by the petals lie the sexual organs, consisting of the stamens and the pistil.

The former constitute the male part, and are composed of a variable number of pale-coloured, often thread-like, filaments, on the top of each of which is a yellowish or brownish head, the anther, bearing the pollen, or fertilizing dust. In the centre of the ring of stamens rises the pistil, consisting of three very distinct parts. The uppermost portion is expanded into a fleshy stigma borne on a stalk-like style, which in turn rises from a swollen basal part, the ovary, in which the ovules, or seeds in embryo, lie concealed. The position of the ovary varies in different flowers. In such plants as the buttercup, poppy, and geranium it is enclosed by the petals, but in others, as in the fuchsia, it lies below the coloured portions.

When the ovules have been fertilized, and thereby transformed into seeds, the ovary becomes the fruit, and often undergoes a complicated series of changes. The apple furnishes a good example of this. Compare the ovary on an apple bloom in the spring with the ripe fruit plucked in autumn from the same tree and the changes will be seen.

The Struggle for Life.

That flowers exhibit an almost infinite variety of shapes is a fact with which every gardener must be well acquainted. It is only necessary to walk through a garden at any time during late spring or summer to have this impressed upon one in no uncertain manner. In rapid succession we note the open blooms of the poppy, the funnel-shaped flowers of the convolvulous, the long-spurred columbines, the pea-like lupins, and the rayed sunflower, together with a host of others too numerous to mention. This almost bewildering diversity of shape in flowers has been brought about not by accident or haphazardly, but in response to necessity imposed on the plants by the conditions governing the struggle for life. Each of the various shapes found represents a special modification, developed in order to adapt the flowers to the visits of certain insects—and all can be explained in this way, and in no other.

What a Flower Is.

So different are the brightly-hued flowers from foliage leaves that it may seem difficult to credit the statement that the flower is in reality only a leaf shoot which has been modified to carry out the special duties of reproduction. It was the poet Goethe who first recognised that petals, sepals, stamens, and the parts of the ovary all originated as leaves, and pointed out how all these structures, apparently so different in every respect, resemble foliage parts in their early stages in the bud.

If a leafy shoot be examined, it will be seen that each leaf, or pair of leaves, is separated from those above and below it by a length of wood. As the tip of the shoot is approached the leaves become nearer together, until at the extremity we find a number of small young ones, apparently all arising from the same point. In the flower the spaces between the leaves have been suppressed, and the outer ring of sepals represent the lower series, the petals the next, then the stamens and the parts of the pistil the terminal series.

However difficult it may be to see in the glorious floral products of our gardens but a mass of modified leaves, there is no doubt that this is what they really are, and evidence of the truth of this statement is offered in plenty by the flowers themselves. The white water lily is one of the most useful for the purpose of showing how leaves may have been transformed into floral parts in easy stages. If a bloom of this plant be pulled to pieces and the portions systematically arranged, it will be seen that the passage from the green leaf-like sepals on the outer ring to the yellow stamens in the centre is a very gradual one, all kinds of intermediate stages being marked. In many instances it is impossible to decide whether a particular part should be counted as a petal or as a stamen, or as a sepal or a petal, for some of the characters of each are shown.

Again, if a very large number of garden flowers are carefully examined, a few are almost sure to show a reversion in some of their parts to ordinary foliage leaves. In primulas some of the sepals may assume the form of the leaves characteristic of the stem, while the small, pea-like flowers of the clover will occasionally change into three-lobed leaves. Many flowers show a few stamens in which the ordinary thread-like filament is wholly or partly changed into a pistil; while it is by no means uncommon for certain varieties of garden roses to produce blooms in which the petals in the centre show the green colour and shape of leaves.

The double cherry may be cited as a further proof of the truth of the theory that traces the origin of the flower to a modification of normal leaves. When a bloom of this kind is pulled to pieces, after the petals have been removed it will be found that the centre is occupied by two folded green leaves, in the place where the ovary should be. Further, as the petals are plucked off, every gradation may be traced from those showing the ordinary shape and character of these parts, through what appear to be half-stamens to normal stamens, which in turn give place to green, leaf-like bodies, which might be either partially developed stamens or leaves.

All so-called ''double'' flowers are likely to show similar half-structures, for the vast majority of them have been raised artificially and have assumed their double character as a result of some of their stamens having been transformed into additional petals. Thus the centres of many old roses will be found to contain malformed petals, bearing partly developed anthers at their ends, or stamens with filaments expanded into irregular-shaped petals. From the foregoing it may be agreed then that, without going outside the garden, it can be shown that leaves may change into sepals, sepals into petals, and these into stamens; but what of the ovary. How shall we understand how this apparently highly-organised part has arisen from a leaf The common culinary pea will enable us to do this without very much difficulty.

The ripened ovary of the pea becomes the pod, with the seeds, or ''peas'' contained within it. If this be opened and laid out flat, it will be found to consist of two equal halves divided down the middle by a thickened rib. The peas are attached to each half along the margin. Place a leaf of the pea by the side of the opened pod; it will at once become evident that, by folding the leaf in half along the mid-rib, an object very similar to the pod is produced, and it requires very little prompting to reveal the pod as a seed-bearing leaf folded in half, and with the free margins joined together.

If the ripened ovary of the garden stock be cut through transversely, it will be found to possess two chambers, in each of which seeds occur. This may be likened to two pea pods placed side by side, with their broad surfaces in contact, except that in the stock the two pods have grown together. Similarly, the violet has three compartments to its ovary, formed in the same way, while other plants have much larger numbers. The leaves which have been modified into seed-bearing bodies are called carpels, and, as has been shown, an ovary may be made up of one or a number of these.

What it Does.

Each part of a typical flower has a definite duty to perform. The sepals serve to form a protective envelope to the young blossom while it is still tender and undeveloped in the bud. The petals act as organs of attraction, or bright banners to advertise to the insects the presence of nectar in the flower. The stamens and pistil are concerned with the production of fertile seeds. But although these are the normal duties of the several parts in many flowers, certain of them are called upon to perform special work. In such cases a ''rearrangement of the staff'' is necessitated.

The handsome bougainvilleas are examples of this, for in these brilliant flowers the coloured portions are not the petals at all, but leafy bracts which have taken over the usual work of the corolla. The poinsettias, valued as ornamental subjects by reason of the vivid scarlet-coloured terminal leaves, have small, inconspicuous flowers, the flaming leaves surrounding the flowering head being sufficient to attract insects to them. In the fuchsia the green calyx has become modified into a bright red-coloured cap, which is much more conspicuous than the deeper purplish petals of the flower.

Pendant blossoms frequently show gaily coloured sepals, the reason being that, to winged insects passing above the plants, the petals, being turned downwards, are practically invisible, and were the calyx to retain the green colour characteristic of this part in most flowers, the blossoms would stand a poor chance of attracting visitors. The bleeding heart and the nasturtium are other plants having drooping blooms with coloured-calyces.

The delphinium and columbine are examples of flowers in which the petals have been changed into receptacles to hold the nectar, and the blue or purple portions of the blossoms of these popular garden favourites are made up of coloured sepals, the corolla being visible in the inside of the flower as a small pale, scale-like body. In the marsh marigold, again, the petals are shrunk into nectaries, and the glossy, rich, yellow bodies, usually referred to as petals, are the sepals which have assumed an attractive appearance. The winter cherry may also be mentioned here. In this plant the highly coloured and inflated calyx forms a sort of bladder, which entirely envelops and conceals the other parts of the flower.

In the beautiful white arum lily, the large white object usually called the "flower" is really nothing of the kind. The real flowers are tiny and situated at the base of the thick, yellow, spike-like body which may be seen projecting from the top of the white portion. The latter is a special structure called a spathe and forms a covering envelope, or sheath, to the flowers proper. It serves to attract insects and thus, in this sense, takes the place of the conspicuous petals of other plants.

The stamens may also operate as organs of attraction, besides carrying out their more usual work as pollen bearers. The acacias and mimosa are examples of plants in which, in the absence of either brightly coloured petals or sepals, the male parts perform the duties of advertising agents.

BOUGAINVILLEA.

Anyone visiting the beautiful garden of Mr. Thomas, at Indooroopilly, will be impressed with the many possibilities of design and effect that can be made with this very hardy and showy climber (writes W.B. in the "Daily Mail"). The appreciation of the bougainvillea is shown by the hundreds of persons who go to see it in bloom. It is a hardy plant, and loves sunshine, and there is no reason why it should not be more widely grown. A little time and patience will amply repay anyone who contemplates its culture. Cuttings strike readily as soon as the blooming period is over. They should be about 12 in. long. Select last season's growth, and plant in sandy soil in a shady place.

Put the cuttings about 6 in. deep in the soil, and press down firmly. Keep the ground moist, not soaking wet. If you require a more immediate result, obtain plants from the florists in pots. There are about seven different colours to select from. When the plants have grown to a height of 2 ft. then select your design and prune accordingly. To train the plant make a skeleton design of wire, and then trim the plant by removing all shoots that may be growing in a direction that is not required. About May or June pruning must be stopped, as all the new shoots then appearing will be flowering shoots. As soon as the blooming period is over commence pruning again to still improve your design.

There are many methods of growing bougainvillea, and one that finds favour with many is that of planting it around an old tree that is not wanted, and ringbarking the tree when the bougainvillea is firmly established. It will then hang down from the branches of the tree and form a beautiful garland of bloom. It is an evergreen and never appears unsightly.

DRACÆNA.

Dracænas are hardy plants with very richly coloured and variegated foliage. They are closely allied to the genus cordyline, with which they are often confused. The difference between the two is chiefly in the character of the fruits, there being generally one ovule in the dracæna and many ovules in the cordylines. Dracænas are among our most beautiful foliage plants. Propagation is generally by cuttings, which root readily at any time of the year. The old stem of the plant, cut into short lengths and planted in a compost, invariably roots, and throws up shoots which may be potted up. The root suckers which are often found upon old plants are also useful for increasing stock. All that is necessary is to cut them off and pot them.

The best soil for potting the young stock is made of equal parts of loam and leaf mould, with sufficient sand to keep the soil porus. Dracænas do not require large pots, but they must be firmly potted and given plenty of water.

Mealy bugs and thrips are the chief enemies. The large leaves permit of the free use of the sponge. Dracænas are fine indoor plants, but they must not be kept inside for more than a week or so at a time, and they must be kept out of draughts.

Farm Notes for November.

FIELD.—Farmers are commencing to realise that quick-manuring wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kaffir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young papaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

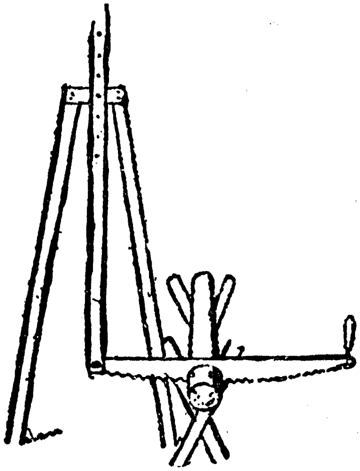
Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged at the beginning of the month;

further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

ONE-MAN SAW.

A very handy sawing device for sawing up the trunks of small trees into short blocks for fuel, to be operated by a single man, is rigged from the ordinary two-man crosscut saw, as shown in the accompanying illustration taken from "Country Gentleman." Two scantlings, each 8 feet long, are driven into the ground about 3 feet apart, with their upper ends leaning almost together. Two 3-inch strips are nailed across the sides of the tops of these posts, through the centre of which is bored a ½-inch hole. A bolt of the same size is passed through this hole, and through a hole in a 2 inch by 2 inch scantling standing vertically—this scantling being on the outside of the cross strips—providing a free swinging support for the end of saw blade. This is shown in the illustration.



There are several holes in this pendulum scantling for adjusting the blade up or down. One of the handles is removed from the blade, and a small bolt is passed through the small hole in the end of the blade and through the lower end of the scantling. Either a sawhorse may be used or cross stakes may be driven in the ground as illustrated to hold the legs while being sawed. As the saw moves back and forth, the swinging scantling holds the end of the saw steady. The device is easily rigged, and is very much appreciated when once tried by those who need to cut wood for fuel.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1927.	October.		November.		MOONRISE.	
					O	Nov.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.34	5.50	5.3	6.9	a.m. 8.36	a.m. 9.41
2	5.33	5.51	5.2	6.10	9.15	10.37
3	5.32	5.52	5.1	6.11	10.1	11.37
4	5.31	5.52	5.0	6.11	10.53	p.m. 12.42
5	5.29	5.53	5.0	6.12	11.49	1.44
6	5.28	5.53	4.59	6.13	p.m. 12.48	2.49
7	5.27	5 54	4.58	6.13	1.53	3.56
8	5.25	5.54	4.57	6.14	2.59	5.3
9	5.24	5.55	4.57	6.15	4.6	6.12
10	5.23	5.55	4.56	6.15	5.13	7.22
11	5.22	5.55	4.56	6.16	6.21	8.32
12	5.22	5.56	4.55	6.17	7.30	9.36
13	5.21	5.56	4.55	6.18	8.38	10.36
14	5.20	5.57	4.54	6.18	9.46	11.30
15	5.19	5.57	4 54	6.19	10.15	...
16	5.18	5.58	4.53	6.20	11.51	a.m. 12.17
17	5.17	5.59	4.53	6.21	...	12.55
18	5.16	5.59	4.53	6.21	a.m. 12.46	1.30
19	5.14	6.0	4.52	6.22	1.36	2.3
20	5.13	6.1	4.52	6.23	2 18	2.33
21	5.12	6.1	4.51	6.24	2.56	3.2
22	5.11	6.2	4.51	6.25	3.29	3.32
23	5.10	6.2	4.51	6.26	4.0	4.3
24	5.9	6.3	4.51	6.27	4.30	4.36
25	5.8	6.4	4.51	6.28	4.59	5.14
26	5.7	6.4	4.50	6.29	5.30	5.56
27	5.7	6.5	4.50	6.29	6.2	6.44
28	5.6	6·6	4.50	6.30	6.36	7.36
29	5.5	6.6	4.50	6.31	7.14	8.32
30	5.4	6.7	4 50	6.31	7.56	9.30
31	5.4	6.8	...	...	8.48	...

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

4 Oct. ☾ First Quarter 12 1 p.m.
11 „ ○ Full Moon 7 14 a.m.
18 „ ☽ Last Quarter 12 31 a.m.
26 „ ● New Moon 1 37 a.m.

Perigee 11th October, at 1 24 p.m.
Apogee 25th October, at 11 48 a.m.

A daylight occulation of Saturn will take place on the 1st about 12.30 p.m. when the crescent Moon and Saturn will be very high in the sky, to the south-east of the Sun, but too near to it for good observation.

The occulation of Psi Orphinci by the Moon will take place on the evening of the 1st soon after 6.30. This should form an interesting spectacle with binoculars or telescope as the Moon, being only six days old, will not be too bright and the dark portion of its disc will first obscure the star. If the sky is clear it can be observed from any part of Queensland.

The big planet Jupiter, not so resplendent as Venus, still less when it is near the full-orbed Moon on the 9th will be apparently moving westward, or in a retrograde direction amongst the small stars of Pisces. The Moon during the first eight days of the month will apparently be passing through the constellations Scorpio, Saggitarius, Capricornus, and Aquarius, reaching Pisces when near Jupiter.

On the 17th Venus will be at its greatest brilliancy. Mercury will be at its greatest elongation, 25 degrees east, on the 18th.

Mars will be nearly in a line with the Sun on the 21st, but far beyond. At midday the planet will be less than one diameter of the Moon below the Sun.

At 11 p.m. on the 21st the moon will pass below or northward of Venus, at the wide distance of 8 degrees, when both are far below the horizon. Throughout October. Venus will be the morning star.

The planet Neptune and Regulus, the brightest star in Leo, will be apparently very near to each other during this month, more especially on the 26th when Neptune will be only two degrees northward of Regulus. They may be best observed about an hour before sunrise, when about 12 degrees north of east; binoculars or telescope will be required to observe the planet.

3 Nov. ☾ First Quarter 1 16 a.m.
9 „ ○ Full Moon 4 36 p.m.
16 „ ☽ Last Quarter 3 28 p.m.
24 „ ● New Moon 8 9 p.m.

Perigee 9th November, at 1 18 a.m.
Apogee 21st November, at 4 54 p.m.

On the 3rd the occultation of Kappa Capricorni by the Moon will occur about 9.45 p.m at Rockhampton and somewhat earlier at more northern places in Queensland.

It will be interesting to notice the nearness of Jupiter and the Moon late at night on the 5th, especially near the time of the Moon's setting.

Between 10.30 p.m. and 11 p.m. on the 10th Omega Tauri will be occulted by the Moon.

The inferior conjunction of Mercury with the Sun on the 10th will be of special interest on this occasion as the planet will make a transit of the Sun's face.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

18 DEC 1927

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. 1 NOVEMBER, 1927. PART 5.

Event and Comment.

Dairying in Australia—Queensland's Prominence.

"QUEENSLAND produces one-fourth of the butter and one-half of the cheese manufactured within the Commonwealth," said Mr. E. Graham, Under Secretary for Agriculture and Stock, in the course of a notable address at a gathering of representatives of the dairying interests of Australia, at Brisbane on 19th October. Stressing the importance of dairying in our national economy he showed that there are, in all, 149,000 persons engaged directly in the industry in Australia. Their production of butter alone aggregates 340,000,000 pounds per annum, of which 145,000,000 pounds finds a quittance in overseas markets. The value of the industry to the Commonwealth is £32,140,000 per annum, and the capital expended in buildings and plant totals £3,500,000.

Continuing, Mr. Graham said that the dairying industry was well organised in comparison with other sections of the primary production, and this was largely due to the brains and energy of the men present at that gathering. To them the dairying industry owed a deep debt of gratitude. The members of the three boards were not well paid for their services, but they had the satisfaction of knowing that they were accomplishing valuable work of a truly national character. The organisation for which they were responsible was exerting a very great influence on the industry.

It was not only the man who milked the cow who was responsible for the advance in the industry; the butter manufacturer had played an important part, too. The good butter maker was the man who did not spoil good cream in making butter. That showed how important was the work of the manufacturer. In order to compete on a sounder footing against the great dairying countries of the world, it was necessary, he said, for them to strive towards a greater production of butter-fat per cow.

In some countries the average production of butter-fat was considerably higher than in Australia. He realised that the responsibility for an increase of the average rested in a large degree with individual owners of dairy herds. Until they tried to bring about a general improvement in production they would not make much progress in the industry. In Queensland herd-testing was performed without cost to the owners, and he advised them to concentrate on this means of reaching to higher average production.

Farming and Grazing—Their Inter-dependence.

ACCORDING to the Annual Report of the Department of Agriculture, seasonal conditions in the course of the year served to demonstrate more strongly the inter-dependence of the agricultural and pastoral industries of Queensland. The failure once again of the normal wet season in certain of the pastoral areas created an extraordinary demand for farm produce as stock foods, both in bulk and concentrated form. High prices for fodders were the rule, and these, in the circumstances, often far exceeded their true economic value. Graziers in the dry country were faced with the necessity of keeping their stock alive at almost any cost, and this had naturally an important influence on the farming industry. A corollary of this condition and its possible cyclical recurrence is that, in districts suited to agricultural development by modern methods of cultivation, more land will be brought into production and cropped primarily for stock foods.

The dependence of districts of low annual rainfall and restricted water resources on more favoured regions for fodder supplies in dry times became more and more evident in the course of the year. This fact must influence largely agricultural development along the lines of fodder production and conservation, and become no inconsiderable factor in the extension of land settlement in the State.

An example of this inter-relationship of our more important rural industries was provided in the North, where the bulk of the season's maize yield, which approached the million-bushel mark, went to relieve the shortage of sheep feed in the Central-Western areas. The maizegrower experienced the satisfaction of a settled and insistent demand for his grain.

Cotton Growing in Queensland—An Adaptable Crop.

THE cotton grower, in the course of the year, according to the annual Departmental review, met with the most extreme combination of climatic conditions that he has experienced since the revival of the industry in Queensland in 1919. The lightness of winter rains generally made field work both difficult and expensive. Dry conditions continued until the end of September, when light to medium rains occurred over most of the cotton sections. From then on there was practically no more rain until mid-December when precipitations were bountiful and general over the cotton belt. January rainfalls were heavy, amounting to as much as 15 inches for the month in some of the sections. Mid-February was hot and dry, but March was marked with copious rains over nearly the whole of the cotton areas. Later precipitations were lighter. It is obvious, then, that cotton-growing was subjected to a fairly severe test as to its cultivable suitability in inland regions in a wet season.

Results indicate, as a whole, that cotton can be grown with profit in these areas under heavy rainfall conditions.

Experiments and results over the previous five years demonstrated thoroughly the value of cotton as a dry-weather crop. The experiences of the past season indicate certainly that good yields may also be obtained when unusually wet weather rules at critical stages of crop development. It has been shown that the cotton plant will yield well over a series of seasons in the main regions selected for its cultivation in Queensland. It requires but the careful observation of demonstrated methods of cultivation to make cotton-growing a profitable enterprise, bearing favourable comparison with other forms of agriculture conducted in what is called the cotton belt.

The Cold Logic of Economical Conditions.

GENERAL conditions of agriculture are reviewed briefly in the Report. The hard, cold logic of economic conditions, it says, is proving a powerful stimulant to more intensive and extensive co-operative effort. Its general practical application calls for the guidance of leaders of first-rate business acumen. The interests of primary industry call, too, for the abandonment of barren debate (which are, after all, often based upon mere abstractions), and concentration on the application of the principles of better business. This has been done in the sugar industry, the practical economics of which have become the concern of everyone engaged in it and who are benefited by its stabilisation, progress, and profits.

The Stability of Agriculture.

WE have to regard agriculture allied with animal husbandary as a well-rooted industry (continues the Report), and not as a hand-to-mouth, year-to-year proposition. That suggests the need for the wider adoption of the longer view that leads to the creation of a proper perspective of the economics and general conditions of rural industry, and relieves us from alternating periods of undue elation and undue depression.

From past experience we know that, on the average over a term of years, conditions in Queensland are distinctly favourable to further development, in a vast degree, of our great and extending primary enterprises. In Queensland good farming, though perhaps not spectacularly profitable, is a safe and sound business.

Advertisement of Adversity—" Bad Business."

THE Report continues: When agriculture meets with economic difficulties through seasonal adversity, or other causes, all the world is told about it; but when other businesses are under the weather financially every effort is made to suppress the fact. Wide advertisement of adversity is, in every calling but farming, regarded as bad business. This psychological contrast, if it can be so termed, leads often to an over-estimation of commercial prosperity and agricultural depression. Taking the longer view, and contrasting it with other callings in which financial mortality is often high in comparison, we come to a clearer appreciation of agriculture as a commercial undertaking.

The Journal.

A STRONGER popular appeal and a substantially increasing circulation among farmers were particularly notable features of the year's progress of the "Queensland Agricultural Journal" (says the Report). As a publication dealing with the principles and practice of agriculture, both technically and scientifically, it is proving of definite value and is appreciated accordingly. It is accepted as an authority on matters relating to the industry it serves efficiently, not only in Queensland but in other States of the Commonwealth and countries oversea. As a medium for disseminating information of educational and economic importance and working field notes it is highly valued. Officers of the Department engaged in directive and specialised work have been generous in their contributions in regard to their frequency, regularity, and practical value, and their material assistance has enabled the Journal to maintain its high reputation as a useful and authoritative publication.

An Agricultural Survey.

THE agricultural survey of Queensland, which is being made with the object of ascertaining definitely and comprehensively, among other things, the character, location, and extent of the various types of soils throughout the State, will take some years to complete, but the Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that the information which, from time to time, was obtained would be available for practical application.

Mr. Forgan Smith said that, in addition to the study of soils, information was being obtained as to climatic conditions, rainfall, temperatures, present vegetation, insect life, and facilities for marketing produce in the districts under review.

The committee first met in February, and on 20th April four field officers—an agricultural instructor, an agricultural chemist with knowledge of geology, a botanist, and an entomologist—set out on a preliminary survey, commencing in the neighbourhood of Flaggy Rock Creek, which was 66 miles south of Mackay, and covering the ground on the coastal side of the range as far as Sarina and the Bolingbroke country on the Connors Range.

Preliminary reports were submitted, and at present the Agricultural Chemist, in company with an officer with a knowledge of surveying, was making a more detailed survey of the Bolingbroke country on the western slopes of the Connors Range.

It was recognised that it would be some years before this survey of the State was completed, but from time to time, as definie information became available, it was thought that much of the agricultural produce now imported could be grown within the State as a result of the knowledge so obtained. There certainly would be on record more definite and accurate information relative to the agricultural possibilities and the future prospects of development of the State.

Bureau of Sugar Experiment Stations.

UBA CANE.

By NORMAN BENNETT, Travelling Scholar.

The Director of the Bureau, Mr. H. T. Easterby, has received the following report on Uba Cane from Mr. Norman Bennett, the Travelling Sugar Technology Scholar:—

Report on Uba Cane—Milling and Payment.

To date, the growing of Uba cane has been confined to those countries where the search for better varieties has been unsuccessful—e.g., South Africa—or in those countries where the existing varieties have been subjected to severe attacks of Mosaic disease, and Porto Rico.

The resistability of Uba cane to Mosaic disease is well recognised, and due to this one property the planting of other canes has been entirely prohibited in South Africa. In Porto Rico and in some of the West Indian Islands, Uba cane was introduced to check the spread of Mosaic disease, but recently the acreage of Uba planted has been reduced, due to introduction of other varieties less resistant to Mosaic but more suitable as regards sugar content and milling conditions than Uba.

The milling of Uba cane has always been attended by considerable difficulty due to the very high fibre content, and also to the high ratio between hard, tough rind and soft pith. Owing to the high fibre tonnage ratio, mill settings have to be widened and extra power (as high as 25 per cent. over softer fibred varieties) is required at the milling station proper so that creditable extraction figures can be maintained. The treatment of Uba cane in a mill set to grind normal canes would result in decreased tonnage and decreased extraction.

Consequently, for best results, it would be preferable to set aside a particular period of the grinding season for the treatment of this cane in order that the mill engineer could adjust his mills to the new conditions and maintain these adjustments during the period of Uba grinding. I am fully aware of the difficulties which would thus arise, but am of the opinion that this is the only efficient method when considerable tonnage of the cane has to be treated.

Under normal conditions in those countries treating Uba cane, the milling equipment consists of some type of crusher or combination of ordinary crusher followed by a shredding device. For the treatment of such hard-fibred varieties as Uba, such a preparatory equipment is essential for obtaining results.

The Cane under Queensland Conditions.

Under Queensland conditions, the milling of Uba cane would be handicapped owing to the following factors:—*Firstly*: It is almost an impossibility, under present conditions, to have cane cut for delivery to the mill in trashless condition. With such a cane as Uba, which retains its leaf sheath firmly, cane delivered to the mill would contain an additional fibre content adversely affecting milling results. *Secondly*: The usual type of shredding device used in Queensland mills is better adapted to the softer-fibred varieties of cane, such as Badila and Goru. Where the rind of the cane is hard and tough, this type of shredder (as I saw it working in Java on B. 247) has no definite shredding action; the results are more like those of tearing the cane into long strips entirely unsuited to the maceration bath system used subsequently in Queensland conditions of milling.

This type of shredder was abandoned in Cuba due to incessant belt trouble when dealing with the hard-rinded Crystallina.

In addition to milling problems introduced in treating Uba cane, further difficulty arises owing to the refractability of Uba juice to ordinary methods of treatment under the lime defecation process. This difficulty is well recognised as being due to the high percentage of gums and waxes, and recent research in South Africa has shown the possibility of extra difficulty arising due to the presence of starch, especially in under-ripe canes.

In ordinary methods of lime defecation, the treatment of Uba juice entails increased settler capacity and, in those factories which do not return muds to the mills, additional filter press area. In South Africa, where Uba is the main variety, the factories are equipped with some type of sulphitation plant in order to assist in removing the settling difficulties always present when the process of defecation alone is used.

Recoveries with Uba juice, based upon recognised formulæ for recovery of sucrose entering manufacture, are always lower than the theoretical value. To my knowledge, there is no system of cane payment which resembles that used by Queensland Cane Prices Board. Generally, a flat rate is fixed by the miller in such a manner as to allow a considerable margin to cover low recoveries on the poorer classes of cane. I understand that some system for cane payment has been introduced into South Africa; the scheme is based upon Queensland practice, but I have no definite details of the scheme. As its application is directed towards conditions where Uba cane is the main variety under treatment, further inquiry might be of considerable value in determining a set of factors applicable to the treatment of Uba cane under Queensland conditions.

In a few isolated instances where a payment scheme is in use, the methods of calculation are based upon two sets of determined figures. The first figure is the "normal juice extraction" and is based upon calculations made from the weights of cane and maceration water together with the Brix analysis of the "first expressed juice" entering manufacture.

A Brix factor for the normal juice is obtained under conditions of dry milling.

$$\text{Brix factor} = \frac{\text{Brix of mixed juice under dry milling}}{\text{Brix first expressed juice}}$$

By determination of this factor at regular intervals, factors for the mill train are obtained that correct variations due to variety of cane, &c.

Using this factor, the Brix of the normal juice is determined from that of the first expressed juice. The next calculation comes from the weight of mixed juice entering manufacture.

$$\frac{\text{Weight of mixed juice} \times \text{Brix of mixed juice}}{\text{Brix of used juice}} = \text{Weight of used juice}$$

$$\text{and } \frac{\text{Weight of used juice}}{\text{Weight of cane}} = \text{Normal juice extract.}$$

In some instances, the daily or weekly averages are taken from this figure and applied to all cane furnished during the period. In others, a flat figure (varying from 75 to 82 per cent.) is taken.

For the sucrose calculation

$$\frac{\text{Brix used juice} \times \text{average mixed juice}}{\text{Purity for period}} = \text{Sucrose in used juice.}$$

This is made on the assumption that the purity of the used juice is equal to that of the expressed juice entering manufacture.

$$\text{Finally sucrose recoverable} = \text{Weight of sucrose in used juice} \left(1{\cdot}4 - \frac{40}{\text{Purity}}\right)$$

This method is well known and described in Spenser's "Handbook." In actual practice the method gives satisfactory results when a factory for Boiling House Efficiency—

$$\text{i.e. } \frac{\text{Actual yield}}{\text{Theoretical}}$$

—is applied for any particular factor and determined at regular intervals during the season to correct for seasonal variations and differing methods of manufacture.

As our Queensland factories make no attempt to weigh the juice entering manufacture, such a system is inapplicable, and any scheme for the payment of Uba cane would have to be considered on actual results obtained by some average Queensland factory which has ground Uba cane solely for a period long enough for the data obtained to be of value. The application of the present formula used in Queensland for cane payments for such a cane as Uba would be, to some extent, unfair to the millowner in view of the increased difficulties in milling and manufacture.

The most equitable scheme would be to obtain data from some South African factories and also from Fairymead, and to base a separate scale on these figures for such a time as additional data is obtained upon our own Queensland factories.

In Jamaica, the question of further plantings of Uba cane has been under serious consideration. Quoting from the "Indian Sugar Journal" of May, 1927, page 241, "There appears to be no great danger of many planters adopting the cane permanently if they can grow canes of a better class. The little or no cultivation required, the heavy yield under unfavourable conditions, and the freedom from disease are all in its favour; whilst its fibrous nature, less juice, difficulty in harvesting and milling are on the other side."

For Queensland conditions, it would be inadvisable to grow Uba cane except on those lands where the sugar yields per acre per year are considerably lower than those with other varieties. In such cases, permission to plant the Uba cane should be modified by the condition that—

(1) Sufficient poor land be planted to furnish cane for a reasonable grinding period.

(2) Such cane to be harvested at one time and subject to agreement between growers and millers.

(3) Adequate consideration be taken in fixing the price of cane so that all increased costs of milling, manufacture, and additional equipment necessary to handle the cane be provided for.

HINTS ON ENTOMOLOGY TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

How to Identify and Control "Army Caterpillars."

During last month (September), larvæ of the common "Army Worm" (*Cirphis unipuncta* Haw.) caused considerable injury to young shoots of plant and ratoon cane in certain localities.

Having been very plentiful this season, growers are advised to look out for caterpillars comprising the second brood, which quite possibly may appear during October in formidable numbers. The occurrence of climatic conditions unfavourable to normal development of the chief parasitic or predaceous enemies of this cane pest are probably largely responsible for such outbreaks. In the case of serious infestations amongst young plants from twelve to eighteen inches high, prompt action should be taken when first chancing to notice the heart-leaves partially devoured, and pellets of excreta from the caterpillars lying between them and around the base of affected shoots. Should the caterpillars prove to be small or only half grown (¾ of an inch long) every leaf may soon be devoured, and plant growth severely checked.

Larvæ of this noctuid moth are striped lengthwise, the fully grown caterpillar—which measures from 1 to 1½ inches long—varying in general colouration from light greenish-yellow to greenish-black. It has three stripes along the sides, the middle one dark and the other two of lighter colour; while along the centre of the back is a narrow white broken stripe, most noticeable behind the head and along the tail-end. Head, greenish-brown, blotched with dark grey or black. Under surface of body, between legs lighter than the back, and more or less mottled.

Eggs of the earlier broods of moths are often laid on rankly-growing grasses in damp, or low-lying situations, from whence the swarms of caterpillars, after having quickly eaten surrounding herbage, &c., travel forward in search of fresh fields to destroy. When an army chances to be of vast dimensions its progress can sometimes be stopped by ploughing deep furrows in front of the line of march taken up by the advancing host of caterpillars; in which case they can be easily captured in holes dug in the bottom of such furrows or trenches, and killed in wholesale numbers.

Ordinary outbreaks can generally be effectively controlled by spraying the cane leaves with lead arsenate, in such manner as to form a poisoned strip or band of about two or three cane rows wide immediately in front of the line of advance. Use 2 lb. of lead arsenate in about 50 gallons of water, taking care to keep the mixture well agitated while syraying it over the leaves, in order to ensure and maintain uniform suspension of this arsenical in the water. In cases of scattered infestation, spray the area affected. Another good remedy is to mix up a poison-bait (1 lb. Paris green thoroughly incorporated with 20 lb. of bran, to which is then added 2 quarts of molasses dissolved in sufficient water to reduce the bait to a thick crumbling mass). Sprinkle pieces about the size of a walnut amongst affected cane rows shortly before sundown.

Large Moth Borer in Evidence.

When 10 per cent. of the shoots of young ratoon or plant cane is found to be attacked all shoots showing ''dead hearts'' should be cut out, taking care to sever the shoots at a point about 2½ inches below ground level. These must be burnt or crushed to destroy any caterpillars or pupæ. In many cases some of the ''dead hearts'' collected will have been caused by caterpillars of the ''Moth Shoot Borer, *Polyocha* sp., which, together with those of the Tineid Moth Borer (***Ephysterus chersæa*** Meyr.), are often responsible for death of the heart leaves of young cane shoots.

CANE PESTS AND DISEASES.

The Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) has made the following report to the Director of Sugar Experiment Stations, Mr. H. T. Easterby, on the Babinda district, from 22nd to 30th September:—

Leaf Scald and Spindle Top are widespread throughout the area, though in the case of the former disease the infection is, on the whole, light. Out of fifty farms visited, every one showed Leaf Scald to some extent in every field, and in passing other farms on the ''jigger'' I did not notice one free from the disease.

The area in which the infection is lightest is Bartle Frere, especially the western end. Here, generally speaking, there are only a few diseased stools in each field, and this is the cleanest place for farmers to buy plants. If those in this area observe carefully to dig out every diseased stool, they will soon have a clean area—at least as far as Leaf Scald is concerned.

Russell River, especially the southern bank, is far otherwise, and some heavy infections were seen both in the Queensland National Bank Estate region and the region opposite Bucklands. Even on the Bucklands road there is fairly heavy infection on some farms.

No. 67 shows slight traces of the disease. In all these places Badila is the main variety grown, but as we approach Pawngilly and Miriwinni there is an increase in the proportion of Clark's Seedling and the Gorus, both of which show serious affection in the acute stage. Reid's Branch, too, shows infection in Badila.

East Russell has a large percentage of Goru and Clark's Seedling; the disease is very evident, and the losses must be considerable. The same remarks apply to Frenchman Creek, Palma, Harvey Creek, Bellenden Ker, and Cucania.

I unhesitatingly suggest that the Gorus should be put on the prohibited list for this area, and that consideration be given to the prohibition of Clark's Seedling, as Goondi has done, in connection with this disease. In the meantime I urge the farmers to discontinue the planting of these varieties, as they are merely serving as foci for infection of our staple northern cane, Badila. We should be taking all the pains we can to conserve this variety, instead of which we are not taking any precautions to keep it free from disease, let alone to improve the variety. The fact is deplorable when we consider how dependent we are on Badila, which is one of the world's finest canes in suitable locations.

Q. 813 seems to do well if planted late, and should do well on soils which are not suited to Badila, but only on those. It is apparently rather resistant to Leaf Scald, though it has not been tested sufficiently to give us any definite data. Being inclined to lodge, it should not be planted before August. It is a good ratooner, and has usually a good c.c.s. E.K. 28 might also be tried, but I have no evidence of its resistance to Leaf Scald. I should imagine it to be fairly susceptible from its susceptibility to other diseases.

Spindle Top has caused the trash to adhere to the canes, and the adventitious roots have sprouted, firmly binding it thereto. This has worried a number of farmers, but is probably due in part to the cyclonic disturbance at the beginning of the year. It is especially bad in the Bartle Frere area, and this unfortunate fact minimises the advantage of the freedom of this area from Leaf Scald. However, it is not confined to this place, but also occurs fairly badly on every farm visited, in Badila, H.Q. 426, and Q. 813. Of course, it is especially bad in grubby areas. The prevalence of this trouble makes it imperative that a change of seed be obtained as soon as possible from such a place as the Tableland, and efforts should be made to arrange this and also for the distribution in the Babinda area. I have prepared samples of Leaf Scald and Spindle Top for the mill, and farmers whom I have not visited can see them there.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) for August and September:—

INNISFAIL.

Two diseases are in need of attention in this area—Leaf Scald and Spindle Top. Leaf Scald has been described in my previous reports, and has been dealt with in Mr. D. S. North's bulletin. The carrying out of the recommendations I have made will control the disease. Just at present it is not showing up to its full extent in some areas, and the Colonial Sugar Refining Company's pathologist at Goondi (Mr. Trivett) finds it difficult to detect just now. The Innifail Estate, which I am told suffers badly, seems now fairly clean, though stools were observed there which showed the disease. Goondi, however, seems the cleanest area, though Scald was seen at Darradgee, Upper Darradgee, Garradunga, Eubenangee, Sundown, Goondi itself, and Mundoo.

South Johnstone is the worst infected, and in all the H.Q. 426 and Goru the losses are considerable. Around Basilisk, Miskin's Siding, Nos. 1 and 2 Branches there are some badly diseased fields of Badila, and at Jappoon, between this place and Silkwood, No. 3 Branch and No. 5 show far too much of this disease. As a district Silkwood and No. 4 form the worst centre of infection that I have yet seen, and on one field of young plant H.Q. 426 many of the plants are quite dead, while others are showing the chlorotic stages. The field will probably have to be ploughed out before harvesting. This is the state of things we arrive at by neglecting the selection of seed. This area shows the necessity of a field officer attached to the mill with the duty of controlling the planting. The sooner this state of things comes about the better.

Mourilyan has its share, though the infection is lighter than at South Johnstone. Liverpool Creek, which was the worst area, has been cleaned up and the worst fields ploughed out. The disease is still present on almost every field, but to a very limited extent, and the time for digging out the affected stools is at hand. If this is done the disease should be completely controlled. Sandy Pocket, Rafa, Boogan, Moresby, Mourilyan, and the Harbour line all show the disease, and on at least one farm at Mourilyan the trouble is epidemic in Badila and H.Q. 426.

The disease is in the chronic stages in Badila and Pompey, and in the acute in H.Q. 426. These two latter canes should, in my opinion, be discontinued owing to their susceptibility, and as the returns from Pompey are, as far as I can gather, very poor, there seems no reason for its retention. As for Badila we must try to select the seed and to introduce some new strains.

Spindle Top.

This name for the disease, for which we have to thank Mr. A. P. Gibson, is rather a fortuitous one, as the main symptom is a rapid thinning out of the top of the cane stick. An alternative name, which is also apt, is Needle Top. It is well to have a popular name (for Pink Sclerotial Disease of the leaf sheath is a mouthful and means nothing to the farmers) to distinguish this trouble from Top Rot, which it superficially resembles. The reddening of the leaf sheaths is characteristic of the disease, and the cane becomes trashbound. The black fruiting bodies of the causative fungus can usually be seen when the sheaths are pulled apart.

That the trouble is due to a fungus of the sclerotial type is known, but much research remains to be done before we can give a definite statement regarding this trouble. This fungus binds the upper leaf sheaths, and chokes the stem and growing point of the cane, which in time will die, and the cane will often rot. The rot is secondary, and it is strangulation that causes death.

This year the disease is widespread, and is causing losses which have in some cases been estimated at over five tons per acre. On most farms quite a percentage of the sticks in each stool are dead or affected, and, in many places, whole patches and whole stools are dead. I am told that the disease is rarely as severe as at present, and it is considered that the flood and cyclone at the beginning of the year have had a great deal to do with it. Areas which have been flooded, or which are affected with grubs, show the disease in all its virulence, and it is usually thought that it is due to a primary check in growth. It seems certain that the weather is a determining factor in the occurrence of the disease, as is probably the case with most of our troubles.

I do not know of any experiments which have been carried out in connection with the transmission, but we can make some pretty sound assumptions. The fact that the sclerotia cling to the leaf sheaths and have been seen clinging to the rind of the cane, shows us that it can be carried with plants into fields which were previously unaffected. It will also be present on the trash left on the field after cutting.

Now, these facts lead us to the obvious conclusions that plan selection will be a control measure, and so I suggest that all canes showing the disease (these are usually red in contrast to the black of healthy Badila) be rejected when planting.

Secondly, the burning of trash is a control measure where the disease is severe, but this is a matter of compromise, for there are great benefits to be derived from the ploughing in of trash. In cases where the percentage of infection is high I recommend that the trash be burnt, but in other cases it is a matter for the discretion of the farmer.

A third measure which the nature of the disease suggests is the disinfection of plants, but experiments will have to be conducted before any recommendations can be put forward.

As Badila is the principal cane infected, and is also the staple variety of the North, it is important that some investigations should be made of the diseases which affect it, and also that the most promising of our seedling canes be tried out under supervision in order to have some tested varieties to fall back on in case of need.

Subsidiary factors which may affect this disease are grubs, drought, flood or cyclonic weather, sodden ground, bad tilth, or bad soil conditions due to impoverishment of the soil.

I do not believe in the promiscuous distribution of varieties, but the planting of trials under supervision will enable us to select one or two which will have desirable qualities, and will be worth propagation on a field scale.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Southern Assistant Entomologist, Mr. R. W. Mungomery, of investigations for the month September-October, 1927.

Effect of "Stinking Roger" *(Tagetes grandulifer).*

Several plants growing in different parts of the world are known to possess poisonous properties, which can be utilised by man in his attack on the insect forces. Powdered hellebore root which contains a poisonous alkaloid, and pyrethrum flowers which give off poisonous vapours are well known examples. Most probably with the above facts in mind, many of our more observant farmers have credited the common weed "Stinking Roger" with the possession of similar properties, asserting that it is actually instrumental in killing cane grubs. Those who have knowledge of this weed will easily understand how this assumption has been made and so widely circulated. "Stinking Roger," well known in the southern districts, possesses a distinct odour, and also certain urticating properties, which are, at times certainly very unpleasant to man. Irritation from this source is often experienced by the uninitiated during hot sunny weather, when scarifying in cane where this weed is growing. As the implement is dragged along the cane rows, the leaves of the weed brush against the backs of the hands. This produces a reddening of the more tender portions of the skin with an accompanying painful itch. Moreover, one often hears of instances where this weed has been growing prolifically and grub damage has been unknown, and this together with its other well known properties has probably had the tendency to become a kind of folk-lore. In certain districts, therefore, there now remains a belief that where "Stinking Roger" grows, no grub damage occurs. In this manner a kind of half-truth has been accepted and made a general rule.

That this is incorrect was proved by field evidence in the Mount Jukes area of the Mackay district, where the grub damage witnessed by the writer during the past two seasons has been of a severe nature, and there this weed comes very much into prominence in the canefields. In this district, at least, there is no faith in "Stinking Roger" ever proving the salvation of their grub-infested crops.

As most popular beliefs usually have some element of truth for their foundations, it was thought that this matter warranted closer investigation with a view of gaining more knowledge of this weed in its relationship to cane grubs. Experiments were accordingly carried out at the Bundaberg Laboratory.

In the first series of experiments, the leaves of the plant were chopped up finely and mixed with soil in cages, and a cane grub (*L. trichosterna*) was placed in each cage. In another case the flowers and young seeds were used in a similar manner, but in no case did the grub show any signs of weakening or flaccidity which usually precedes death. This result was obtained even though the earth in the cages smelt strongly of the essential oils which so characterise this weed.

A second series of experiments was later conducted in which "furfuracea" cane grubs were used throughout the tests. On examining the cages after they had been set up a few days, some of these grubs were found in the act of eating these leaves, upon which they apparently thrived, for they seemed quite as healthy and normal at the conclusion of the experiment as at the beginning. As a crucial test, this weed was pounded up in a mortar and the juice was extracted from it. Each grub was then completely immersed in this juice for a few seconds and later transferred to cages containing moist soil, but it was found that this in no way inconvenienced the grubs, and results from these tests were equally convincing that the weed possessed no insecticidal properties as far as two of our worst cane grubs were concerned.

This experiment confirmed previous experimental work carried out by Mr. Jarvis with "Stinking Roger," but in his case cane grubs of the "greyback" beetle were used. However, this was not the primary object in view, for it was thought possible that with our southern grubs representing different species of different genera, results might vary somewhat. Thus the experiment was repeated using our southern cane grubs, but the results coincided with Mr. Jarvis's findings. He showed than "cane grubs have a decided liking for leaves of this weed." In this way, it is highly probable that when this weed is ploughed under grubs will feed on it, and not be forced to turn their attentions to the cane stools, and this would serve to explain how some cane crops suffer less when this weed has been growing on cultivated land. Whether it is effective in warding off ovipositing beetles still remains an open question, but from experience at Mount Jukes there seems little to support this contention.

Effect of Subsoiling.

It is the custom on several of the larger plantations in the Bundaberg district to carry out subsoiling operations after cane has been ploughed out and previous to the planting of another crop. From an entomological viewpoint, this should be carried out during the months of September and October in order to gain the utmost of an advantage which this system possesses over ordinary ploughing. During these months cane grubs which are about to turn into beetles and emerge in the following November or December are either in the helpless prepupal stage or have already turned into pupae. Both of these are located in nicely fashioned earthen cells, at an average depth of about 15 inches, so that the ordinary plough generally skims over the top of them. However, when the tines of the subsoiler pass through the soil they usually crush or break these cells. If the cell be crushed the grub or pupa naturally suffers a similar fate, but if the cell be merely broken or disturbed, the surrounding soil falls into it. In this latter case the grub is too helpless to make another cell for itself and further, both it and the pupa (whichever the case may be) are then unable to cast off their skin when passing into the succeeding stage, with the result that the insect emerges a cripple. Thus, by preventing the emergence of beetles which are likely to reinfest the same fields, the practice of subsoiling carried out during the above-mentioned period has far-reaching effects.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Assistant to Entomologist, Mr. G. Bates, on the Pialba and Nambour Districts.

PIALBA.

This district was visited during the early part of August and was found at that time to be free of any serious insect damage. However, despite this, certain insects are at times responsible for injury to cane on individual farms, wireworms being the chief source of annoyance.

Wireworms are larvæ of Click Beetles, belonging to the family Elateridae. These beetles are often seen around the lamps during the summer months, and can be recognised by their habit, when turned on their back, of jumping upward and landing right side up. The larvæ (or wireworms) can be recognised as being cylindrical, body shining yellow in colour, with a dark-brown head. They vary greatly in size, but when brought under the notice of the growers by damaging cane, are then from 1 to 1½ inches in length. They live underground and cause injury to cane by eating the eyes of sets and chewing through the base of the young shoots. From information gathered it appears that the bulk of damage is occasioned during August, due most probably to the fact that a large portion of the planting is done during that month, and perhaps owing to weather conditions, as the sets do not strike as quickly as those planted later in the year, thus giving the wireworms every chance to attack them and destroy the eyes. At the time of my visit practically no land had been planted up, so that up to the present little damage had been reported this year, but is likely to occur to cane planted during the present month or later.

As the life history of these particular wireworms has never been worked out or studied in detail, no definite basis of control can be laid down, but growers can tend to minimise the damage by thorough cultivation and the use of good healthy plants, thus giving the crop a start without any undue handicap. Wireworms are plentiful in land growing paspalum and other grasses, and when these lands are given two shallow ploughings and planted up, the grower is simply courting trouble. Poor cultivation and the use of inferior plants is in itself sufficient to cause a poor strike, sets lying a long time in the soil without germinating, and then throwing sickly and slow-growing shoots, and it is in places such as these that wireworms cause considerable damage, for when shoots are eaten off the plant has insufficient stamina to throw another from the base of the injured one.

Moth Borers (*Phragmatiphla truncata*).

The caterpillars of this insect which tunnel the sticks of large cane and the shoots of young ratoons are to be found on practically every farm in the Pialba district to a greater or lesser degree. They are particularly noticeable along headlands and where cane has been allowed to become weedy. The prevalence of this insect in the Pialba district this year is probably due to the fact that owing to weather conditions, which made clean cultivation impossible, cane became weedy and headlands overgrown, thus giving rise to ideal conditions for the breeding of this pest.

The Black Beetle.

Several growers complain of injury to young cane by a species of beetle commonly referred to amongst themselves as the "Black Beetle," and which is known to science as *Pentodon australis*. The damage by this beetle is similar to that caused by wireworms, the beetle chewing the eyes of sets and young shoots, as well as burrowing into the set itself. Injury by this beetle has not been so noticeable during the past two years as formerly, and so far this year no damage has been recorded.

Grubs.

Third stage grubs of an undetermined species of Scarab beetle were found damaging ratoon cane in red soil in one portion of the district. The grower has not had any damage previously, and this year it is not serious, only a few stools being eaten, so that this species cannot as yet be classed as a serious cane pest.

Grubs of the Christmas beetle (*Anoplognathus boisduvali*), and *Dasygnathus australis-dejeani*, were found under cane and in cane land, but not in sufficient numbers to be capable of causing appreciable injury to cane.

NAMBOUR.

Grubs.

"White Grubs" are to be found in all parts of the Nambour district, and at times are responsible for more or less serious damage. Ratoon cane is not injured to any extent, the damage being mainly confined to young plant. The grubs attack the sets as soon as they are planted, eating the eyes and young roots, besides chewing into the set itself.

While there are several species of white grubs to be found in cane land in this district, the most common are those of the Christmas beetle (*Anoplognathus boisduvali* Boisd.). They are particularly plentiful in paspalum land, and for that reason are known to most of the farmers as the "Paspalum Grub." When this land is broken up and cane planted without first thoroughly cultivating the soil, damage is most likely to occur, and although grubs of the Christmas beetle are not such voracious feeders as some of the other well-known cane beetle grubs, they are, given suitable conditions, capable of causing considerable damage. So far this year the damage has been slight and growers remark about the scarcity of grubs seen while ploughing, and some of them attribute this to the heavy rain which fell towards the latter end of last year, when the ground became waterlogged, and grubs could be seen floating about and lying dead on the surface of the ground.

The Black Beetle (*Pentodon australis* Blk.).

This is another insect pest of the Nambour district and one with which most growers are familiar. It is capable of doing considerable damage to young plant cane, and was troublesome in certain parts of the district about two years ago. Since then the losses caused have not been serious, and so far this year no damage at all has been recorded. The beetle often flies to light and is plentiful in paspalum land.

Moth Borers (*Phragmatiphila truncata* Walk.).

This insect is to be found on practically every farm, and with the exception of a couple of instances is only responsible for minor damage. This is mainly confined to headlands, and except where cane is required for plants, very little damage is done. The presence of a small Braconid wasp, which is parasitic on the larva of the moth borer, is a big factor in keeping this insect in check.

Rats.

The depredation of rodents is to be seen in several parts of the district, chiefly on the low-lying country towards the junction of Petrie Creek and Maroochy River, also in one or two places on the river. The damage caused at present is not alarming, but could easily become so, and growers would be well advised to keep them under control by spreading poison and destroying the undergrowth that harbours them. Ripe bananas, poisoned with strychnine, is said to give splendid results and may be worth a trial.

Redbills or Water Hens.

These birds are sometimes responsible for damage to cane similar to that caused by rats, except that they leave the internodes more shredded, whereas the rats make a more or less clean wound.

MARYBOROUGH AND MOUNT BAUPLE.

A few days were spent in these districts towards the end of August, and at that time they were found to be free of any damage by insects, the farmers being more concerned with losses from diseases.

Moth Borers (*P. truncata* Walk.) and Mealy Bugs (*Pseudococcus calceolariæ* Mask.) were the only insects seen in any numbers, and these were only doing minor damage that does not call for any control measures. Crickets were also found in cane land and were, in one instance, reported to occasionally damage young cane.

Other minor pests such as Mealy Bugs (*Pseudococcus* sp.), Leafy Hoppers (*P. saccharicida*), and Aphis sp., were found in small numbers in several parts of the district. These would, in all probability be more numerous during the warmer months of the year.

EVERY PRODUCER SHOULD TAKE THE JOURNAL.

Thus a Grandchester farmer (20-9-27): "I am enclosing herewith postal note for amount of 4s. for which kindly forward the 'Queensland Agricultural Journal' for four years. This Journal should be in the hands of all producers, whether experienced or otherwise, for in every issue there is a fund of information that is beneficial to either."

FIELD REPORTS.

The Northern Field Assistant, Mr. A. P. Gibson, reports (3rd October, 1927):—

INNISFAIL.

Goondi.

This mill does not depend on the Government railroad for the transport of its cane supply or the getting-away of its sugar; the latter is wholly removed by several small floaters which steam up the Johnstone River to the factory and take away upwards of 270 tons of sugar per trip direct to Cairns. The factory is expected to crush some 158,000 tons of cane; it has had a good run and is treating big weekly tonnages, and speedily clearing its area of millable cane. Harvesting is about up to expectations. Some neglected fields were noted; these are generally a menace to the surrounding good ones.

Badila (N.G. 15) and Pompey (7 R. 428) are the varieties grown. The latter cannot be classified among the good varieties; besides being rather low in quality, it is becoming highly susceptible to most diseases. This cane is sometimes recommended for the poorer soil. It, however, is too frequently grown on our better lands. The area planted to this kind is fortunately being rapidly decreased, and that of Badila increased. Some of the undulating volcanic red soil areas more recently planted with cane and yet stumpy are being cleared in readiness for the plough. Working soils (especially the clayey kinds) when overwet upsets the physical condition. Although this is generally known, yet it is frequently done, as otherwise the whole routine of field work would be delayed. Areas tilled when wet may be detected easily; generally they are very lumpy and appear dry. Some farmers roll the trash in ratoons and plough in when turning out the old stubble; others burn everything. The make-up of the trash is mainly derived from the soil, air, and water, therefore the soil is naturally enriched when this is returned to it. It is sometimes very necessary to destroy trash by burning in order to control destructive pests and fungi. Tractors, big and small, wheel and caterpillar action, are going their hardest, drawing various makes of implements suitable for all classes of field culture.

Stools of Leaf Scald disease and Spindle Top were noted throughout the area; the latter is too prevalent and is responsible for big annual losses. This is occasioned by a fungus which binds the sheath to stems—generally one or two canes are troubled; whole stools, however, frequently perish from the effects. The non-planting of such canes and trash-burning would help to control this fungus. Smothered canes or those having had their growth checked invariably are affected. The growing tendency is to place Badila seed too close, which is responsible for cramping, smothering, and probable increase of Spindle Top.

Weevil borers were very active in parts. This is probably sugar's second greatest pest; its spread might be arrested by the Tachinid fly—one of its known parasites—clean fields, and more careful plant selection.

Mourilyan.

The value of efficiency in field and factory is being more understood; this is of paramount importance and should ever be our goal.

Improvements.—The efficiency of the local mill has been raised remarkably since the installation of larger and more powerful crushers. When the boiling-house has been enlarged and modernised few mills in Queensland will be superior.

Milling.—The factory is working well and treating its greatest crop in record time. One thousand two hundred and thirty-five tons of cane were milled during the twenty-four hours ending 4 p.m., 9th September. The weekly mill average c.c.s. is excellent, being 15.95 per cent. Some 6.4 tons of cane are used to make a ton of sugar. Eighty-six thousand tons had passed between the rollers, just over one-half of the crop estimated. Under 3 per cent. of the cane being crushed is burnt by permission. When the factory was visited the management were worried, as it was obvious that the mill must soon cease operations unless some of its stored sugar was removed. Three thousand tons of bagged sugar were stacked under the mill roof, where it is likely to deteriorate; extra labour was needed to stack much of this. The weekly output of sugar is now over 900 tons; this has been gradually accumulating. It seems very evident that the number of ships visiting this port is inadequate to remove the district's ever-growing annual supply of manufactured sugar. What would the position have been had the South Johnstone Mill been crushing normally?

Crops.—Crops looked remarkably well, and continue to grow slowly. They appear to have about reached the degree of excellence so far as quality is concerned, and are harvesting quite up to early expectations.

Chief among the varieties grown is Badila (N.G. 15). Of this kind there is about 99 per cent. It is gratifying to note that the management is endeavouring to eliminate Pompey (7 R. 428), a cane generally low in quality and purity. The following is what they have to say about it in a circular recently issued to its growers:—

"Already 1,000 tons of this kind have been milled. The average c.c.s. of the plant has been 8.9 per cent., that of ratoons 10.65 per cent. The minimum c.c.s. was 7.05 per cent., the maximum 10.9 per cent. In addition to the low c.c.s., the purity of the juice is also low. As a comparison with Badila treated to the same time, the following figures may serve to explain further the unprofitableness of growing this variety:—

With sugar at £21 1s. per ton—

Pompey (7 R. 428), plant 8.99 c.c.s.—19s. 6½d. per ton.
Pompey (7 R. 428), ratoons 10.65 c.c.s—26s. 1¼d. per ton.
Badila, plant and ratoons, 13.65 c.c.s—37s. 4¼d. per ton.

If the growers are wise they will refrain from the further planting of this kind. A small apparently healthy patch of B. 208 was observed growing on a brown porous soil at Moresby, and in growth somewhat surpassed that of Badila and H.Q. 426 interplanted amongst it.

Field Work.—Great activity prevails on most farms; the weather is perfect for all outside operations. Tractors are wonderful helpers in speeding up this class of work. Trash dry and of a medium thickness was being successfully ploughed under by a tractor-drawn Saunders plough. Fields harvested some ten weeks ago had been improperly cultivated and replanted. Many of the old stubbles had not been ploughed out, and what had been lay thickly over the area. The former frequently serves to carry on a disease, the latter hampering considerably all subsequent cultivation.

Different kinds of manures at different rates are being applied to the plant and ratoon crops. Coral from the shores of nearby islands is being pulverised and boated over to the mainland for use as lime in the sugar fields. Flue dust is being broadcasted over some of the adjacent mill farms. This dust is likely to contain much potash, especially that taken from mills burning most of their molasses.

Diseases.—Leaf Scald, Spindle Top, Weevil borer, big moth borer, tineid moth borer, and rats are responsible for more or less damage throughout the area. Farmers should get to know these pests and diseases, and refrain from planting affected canes.

South Johnstone.

The question of the moment is how much of the big 1927 crop will be harvested; this of course is dependent on subsequent weather and period of crushing. At present it is obvious that a large area will remain uncut; big crops of matured cane when left over generally grow heavy, tumble, become rank, and greatly injured by weather and vermin.

Grinding.—This is the time when the cane possesses its maximum amount of sugar, when the weather is generally at its best, and when all factories go their hardest—many even work overtime in consequence.

Crops.—The almost rainless weather this and last month has now retarded the crop growth and has immensely benefited the outlook from a sugar point of view.

Small, apparently unfruitful patches were again met with in the porous volcanic red soils; such a condition may easily be distinguished by the absence of chlorophyll (green matter) of leaves. This points rather to the probable deficiency of food or foods, possibly potash.

Silkwood.

Diseases.—Leaf Scald is too prevalent in this area, being severe in most varieties grown. The eradication of the Goru family, the growth of less H.Q. 426, more Badila, and the use of disease-free seed is urgently recommended. Gum-like streaks were found in H.Q. 426 at Silkwood. Cutting plants by contract is not a good idea—anything that will help to fill up a bag is frequently classified as a plant by the contractor. It would be difficult to find fields absolutely free from Scald at Silkwood and parts of South Johnstone; even paddocks of newly-planted H.Q. 426 were already dying out in parts from this disease.

NOTES ON THE BREEDING OF CERTAIN FRUIT FLIES IN CAPTIVITY.

By HUBERT JARVIS, Entomological Branch.

The Queensland Fruit Fly (*Chætodacus tryoni* Frogg.).

Although the period occupied in the development from the egg to the perfect insect of the fruit fly, *Chætodacus tryoni* Frogg. and other allied species has long been known, it is only recently that the Queensland fruit fly, *C. tryoni*, has been induced to mate, oviposit, and complete its development in captivity. The following information was secured by experimental work carried out at Stanthorpe, during the season 1926-27.

On 10th January, a large field cage 6 feet high, 8 feet long, and 6 feet wide was placed over a small apple-tree in an orchard. This tree was carrying a crop of forty-eight apples of the variety known as Delicious. Each apple was carefully examined and found to be clean and sound. The soil around the tree was cleared from weeds, &c., and all possibility of the escape of flies or maggots eliminated.

On 18th January, about one-quarter of a bushel of maggot-infested fruit was placed in the cage on the ground around the tree. This fruit contained fruit-fly maggots in varying stages of development, the largest being about three-quarters grown.

The first fruit flies emerged in the cage on 7th February, and at the end of the month fifteen or twenty flies could be easily counted. The flies were fed twice weekly, on a dilute sugar and water solution, and from this date onward the fruit was periodically examined for oviposition.

On 21st March, the first stung fruit was observed. The maggots at the time were all in an early stage of development, the largest being about one-quarter grown and the smallest just emerged from the egg. On the date in question males and females were observed together on the fruit, and in one or two instances mating was noted at 10 a.m. Only a few apples were found at this date to be stung, but by the end of the month my assistant, Mr. S. M. Watson, reported additional apples infested, and at the conclusion of the experiment fourteen apples out the forty-eight were found to be infested.

It would appear therefore that the pre-oviposition period of *C. tryoni* in normal summer weather, under the conditions prevailing in the cage, is of at least a month's duration, and it is probable that oviposition first took place about 10th March.

Although no definite data in regard to the mating and oviposition of the Queensland fruit fly has yet been secured, the information obtained is of interest, demonstrating as it does, for the first time, that the fruit-fly will mate and oviposit in captivity under the conditions mentioned.

The Jarvis Fruit Fly (*Chætodacus jarvisi* Tryon).

The fruit fly *Chætodacus jarvisi* Tryon although of less economic importance than the foregoing species, arriving as it does much later in the season than *C. tryoni*, nevertheless does considerable damage to pommaceous fruits during the months of February and March.

It made its appearance in the orchards this season on 17th February, and on that date a number of living specimens were collected for experimental purposes; the following experiment proves that this fruit-fly will oviposit in captivity, even when confined in a small cage.

A wire gauze flyproof cage 18 inches in diameter and 2 feet in height, was placed on a wide tray containing damped soil. From the roof of the cage one apple of the variety known as Jonathan and one pear of the Winter Nelis variety were suspended; the fruit selected was in a ripening, but not ripe condition, the apple being slightly more mature than the pear.

On 19th February twenty female flies and ten males were liberated in the cage, and they were daily supplied with small pieces of freshly-cut apple and pear on the juices of which they fed greedily. Oviposition took place on 3rd March in the apple and on 11th March maggots were found to be from one-quarter to half grown. The apple was accordingly removed and placed in a breeding jar. Puparia were found under the fruit on 21st March and the flies began to emerge on 12th April. Thus the life cycle of this fruit fly was completed in captivity in about five weeks and five days.

During the experiment the flies were observed to repeatedly visit the pear and feed on some slight exudation on the surface of the fruit, but they did not oviposit, and the pear remained in a sound condition at the conclusion of the experiment.

Although the fruit fly *C. jarvisi* was much more abundant in the orchards during the months stated than was *C. tryoni*, breeding experiments from fruit collected at the end of February showed, on the flies emerging, *C. tryoni* 20 per cent. in excess of *C. jarvisi*.

PROTECTION OF NATIVE FAUNA.

The Minister for Agriculture, Mr. W. Forgan Smith, in commenting recently on the matter of the protection extended to native fauna in Queensland, mentioned that the revenue derivable from the royalties on the sale of opossum and bear skins had already been instrumental, and would be much more so in the future, in materially assisting his Department in the preservation of our desirable native birds and animals. Some eight months ago, he had been able to appoint five full-time rangers. These had been stationed in different parts of the State, and, judging by the numerous inquiries that were now being made on native fauna matters practically every day in his Department, they had all made their presence felt in each of the districts in which they are stationed.

Owing to the non-existence in the past of stipendiary inspectors, due to the absence of funds, many of the provisions of the Animals and Birds Acts had been, up to this year, to some extent inoperative; but with the appointment of officers, whose time is exclusively devoted to ensuring the enforcement of the law, a far better measure of protection to our birds and animals is now afforded. The fact that within the past three months there had been forty-five convictions for breaches of the law is further evidence of the rangers' activity. In saying this, Mr. Forgan Smith added that he was still quite appreciative of the splendid work that had been done in the past by the honorary rangers, of whom his Department had 294 enrolled. The Police had been, and were still, ably co-operating in the work.

The whole of the royalty received on the account of opossum and bear skins is placed to a special fund, which is earmarked for the sole interests of our native birds and animals which have an economic or other value.

There are at present in Queensland 154 sanctuaries with an aggregate area of 1,500,000 acres, and no birds or animals can be trapped or shot in these. Here again, the full-time inspectors were ensuring that these reservations were sanctuaries not only in name but in reality.

The Minister hoped to be able to do something with the funds at his command in the direction of a further restocking of districts which had been denuded of native bird and animal life from districts where they were still plentiful.

IRISH BLIGHT OF TOMATOES.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Irish Blight is commonly considered as a disease of the potato rather than the tomato, since it was in connection with the former crop that it first reached economic importance. The disease is due to the attack of a fungus parasite—*Phytophthora infestans*. It was apparently introduced into Europe from South America, the original home of the potato, some time prior to 1842, for at this time it has been recorded as being well established in Europe. In 1845 a serious epidemic occurred in both Europe and North America, of which one of the results was the noted Irish famine. Further severe outbreaks have occurred since then when climatic conditions have been suitable. The tomato is a close relative of the potato, and for that reason several of the diseases affecting one have been able to attack the other. Of these Irish Blight is an example.

Symptoms.

The first easily noted signs of the disease take the form of dark-brown patches on the leaves, commonly working in from the margin. If the weather is at all wet these areas will assume the appearance of a soft rot and enlarge rapidly. Finally, the entire leaf may become affected and shrivel up. Blackish patches also occur on the stem and leaf stalks. The disease in this case may produce complete encturing, when the whole of the outer portion of the branch affected will wilt and die. Under moist conditions there will be seen on the under surface of the leaves and on the stem covering the brown areas a delicate whitish down formed by the fruiting bodies of the fungus as they project out from affected tissue. The grower's attention is usually more especially attracted to the disease when the fruit is attacked. A somewhat diffuse light-brown patch arises on the skin of the green fruit. This enlarges and may finally cover a large proportion of the surface, at the same time turning a dark though somewhat mottled brown colour. The margin of the discoloured area may be definite or may diffuse gradually into the general green of the healthy skin. On cutting through an affected area the discoloration will be seen to extend right through the skin of the fruit and may penetrate even the pulp and septa. Very often the fruit rot extends to considerable dimensions before the fructification is produced. This appears later during humid weather as a delicate white mould on the surface of the affected region. The fruit may sometimes constitute the main portion of the plant attacked.

Causal Organism.

The fungus causing Irish Blight in its ordinary growing stage is very similar to most other fungi, and consists of clear slender-branched threads or mycelium—these threads being less than one-thousandth of an inch in width. They ramify among the cells forming the plant tissue, absorbing nourishment for themselves, and thus bring about the destruction of the invaded part and produce the symptoms described above.

If the weather is sufficiently moist the fungus after a few days vegetative growth will commence to form its fruiting stage. Short aerial threads or hyphæ grow out through the breathing pores situated on the under surface of the leaf and other parts attacked. These branch three or four times, and on the ends of the branches are formed delicate lemon-shaped spores or fungus seeds. These spores are produced in enormous numbers and are so minute that they can easily float about in the air and thus serve to spread the disease throughout the field. Should a spore come to rest on a tomato plant moist with dew or rain, its contents divide up into from six to twelve smaller portions which escape from the spore case and swim round in the surface moisture by means of two vibratile filaments. These swarm spores, as they are called, soon come to rest and send out a slender thread known as a germ tube, which penetrates the surface of the plant, and commences once more on a period of vegetative activity within its tissues. If conditions are not suitable for the development of swarm spores, which must have moisture for their existence, the spore itself may sometimes develop a germ tube direct.

Contributing Conditions.

Unlike those of many fungi the spores of *Phytophthora infestans* are thin-walled and delicate, and are therefore restricted to certain ranges of temperature and moisture for their development and continued existence. Probably the best temperature for the development of the disease lies between 60 deg. and 70 deg. Fahr. The spores are killed if the temperature approaches 80 deg. Fahr. for any length of time, and at temperatures round about 90 deg. Fahr. the mycelium itself soon dies out in the leaf tissues. For the germination of the spores leading to spread of the disease abundant moisture is necessary, either in the form of heavy dews or rain with accompanying humid conditions. Thus for the occurrence of an epidemic there must be a certain combination of temperature and humidity. In Queensland a temperature suited to the development of Irish Blight is only likely to occur during the cooler months. This period usually coincides with the dry season, hence this disease in normal years does not reach serious proportions. However, it sometimes happens that a period of wet weather occurs during the autumn, winter, or early spring growing season, and considerable loss from Irish Blight is the result. This was well illustrated by the outbreak of Irish Blight in the Bowen district during July-August of this year. Rain to the extent of 1·8 inches fell on 23rd and 24th July accompanied by a sudden fall in temperature, the daily maximum from 23rd July to 3rd August ranging from 57 deg. to 77 deg. Fahr., with an approximate daily average of 58 deg. Fahr. With the advent of hot, dry weather the loss from Blight rapidly diminished. Somewhat similar conditions occurred, on 5th, 6th, and 7th July, and it is probable that the disease commenced to develop at this time though not to an extent sufficient to attract attention. Growers should, therefore, be prepared to take steps to minimise the loss from Irish Blight. The precautions necessary will also aid in controlling certain other leaf diseases to which the tomato is subject.

Control.

(1) General farm sanitation will go a long way to control most fungus troubles. Plants dying apparently from disease should be immediately removed and burnt. If leaf disease has been present the whole of the crop should be destroyed after harvesting is completed. When possible the same ground should not be planted to the same crop two seasons in succession. Tomatoes should not follow potatoes and vice versâ. The planting of potatoes should be avoided altogether if tomatoes are the main crop.

(2) Bordeaux or Burgundy mixture has been shown to give an effective control over Irish Blight if properly made and applied. The plants should be sprayed when about 6 inches high, and again as often

as necessary to keep the foliage well covered with poison. The number of applications will depend on weather conditions. During wet periods spraying may have to be done every few days, as it is at this time that the spores are best able to germinate and the protective covering of spray is liable to be washed off by the rain. The spraying should be thorough in order to ensure that both upper and lower surfaces of the foliage are covered.

The preparation of both the above mixtures consists essentially in the precipitation of an insoluble copper compound, which although not injurious to the plant will yield sufficient poison to prevent fungus spores germinating.

For Bordeaux mixture there is used 6 lb. bluestone (copper sulphate) and 4 lb. quicklime to 50 gallons of water.

Burgundy consists of 6 lb. bluestone and 8 lb. washing soda to 50 gallons of water. This mixture is the more favoured of the two in some districts as it is somewhat easier to prepare and good quicklime is not always available. Care must be taken that there is no excess of soda, as unlike lime this substance may injure foliage.

There is little to choose between the fungicidal values of the two mixtures when properly prepared. About 50 to 100 gallons will cover an acre, depending on the type of spray pump used and the size of the plants.

The bluestone is dissolved in half the quantity of cold water in a wooden vessel. This is best done by tying the crystals in a piece of hessian, &c., and leaving them suspended in the water over night. Pulverised bluestone may now be obtained which is quickly dissolved.

The quicklime or washing soda is added to the remainder of the water in another vessel. Quicklime is best first slacked by the gradual addition of small quantities of water, as the heat generated will aid the reaction.

The two solutions—bluestone and lime or washing soda—are then poured simultaneously through a strainer into a third container or the spraying vessel and the mixture stirred well for a few minutes.

Only wooden or copper vessels can be used to contain bluestone solutions, as this chemical will eat through iron.

It sometimes happens that the lime or soda used is not of good quality and the resultant mixture may then contain a surplus of bluestone. This must be avoided as copper sulphate is capable of causing injury to the plant. An excess may be tested for by allowing the gelations precipitate to settle out of a portion of the spray and then applying red and blue litmus paper to the clear liquid remaining on top. If the blue paper is turned red, more lime must be added until no change takes place. If Burgundy is being tested and the red paper turns blue, more bluestone will have to be added as free soda in this case may also cause spray injury.

A rough test for excess bluestone is given by allowing a clean knife blade to remain in the mixture for a few minutes. When this shows a brown coating of copper on removal, more lime or soda is required.

The spray should be applied as soon as possible after preparation as it tends to lose its gelatinous nature and settle out.

COTTON CROP PROSPECTS.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that from reports which had been received from the Departmental field officers, it appeared that the planting conditions over the whole of the Cotton Belt were the best that had been experienced in recent yars. Not only had excellent rains fallen, but the standard of the preparation of the seed bed was of a decided improvement over those of recent seasons. The experiences of growers, in nearly every district during the past seasons, have demonstrated conclusively that early prepared seed beds are of marked advantage in obtaining an early planting. It also has been demonstrated that early planted crops afford a better insurance of obtaining larger yields. Those facts are impressing the growers more forcibly each season, and this past winter has seen most of the growers endeavouring to prepare their land at the earliest opportunity.

The wisdom of such a procedure has been shown this season in several of the districts. Planting rains fell in the Dawson, Callide, and Upper Burnett Valleys around the 11th September. Those growers who had prepared their land in July and early in August were able to obtain a splendid strike on these rains. The recent series of storms will assure the development of the young plants in such crops, and will enable them to resist any periods of hot dry weather which may occur later.

Price Prospects.

Such an excellent start augurs well for those growers who have been able to obtain the early strikes. The indications are that the prices for this coming crop will be satisfactory, and will compare more than favourably with those which have been realised for the crop which has just been harvested. The Cotton Board has paid up to 4½d. per lb. for the top grades, and advise that it anticipates being able to pay at least another half-penny in the final bonus distribution. These prices have been obtained on a market in which the ruling values were of much lower average than appear probable for the coming crop. Recent cables state that the United States Government forecast for the American crop which is being harvested now, indicate a probable crop around 12,700,000 bales as compared to 17,000,000 bales for last season. The cause of such a marked reduction has been the recurrence of the boll weevil in such numbers in some sections as to destroy the greater part of the crop. If this forecast is realised, it means that the large carry over of cotton throughout the world's cotton markets will be diminished. This will tend to firm the prices and prevent such a disastrous drop as that which occurred in respect to the last crop.

The Cotton Board has intimated that it is making an effort to arrange so that a larger initial advance may be paid to the grower for the coming crop on the receipt of his cotton at the Ginnery. This, in conjunction with the excellent prospects for good prices, should make cotton-growing a very attractive proposition to those growers residing in the proved cotton-growing districts.

Demand for Queensland Cotton.

Recent advices indicate that the Australian demand for Queensland cotton will be considerably increased for the coming crop. This fact, in conjunction with the very opportune rains which have fallen this spring, make it appear that every cotton-grower should endeavour to plant the maximum acreage which he can grow properly. Seed applications indicate that the growers in the Central Queensland areas are following this practice, as marked increases in the individual growers' acreages are reported.

The occurrence of good rains recently over the area extending southwards from Gayndah should lead to a greater acreage being planted in the Southern districts. The indifferent results experienced during the last three seasons in these districts have checked the development of the industry to a great extent. These results have in a great measure been due to insect attacks on late-planted cotton.

EVERY FARMER SHOULD HAVE THE JOURNAL.

A Bell farmer writes: "I must say your Journal is very interesting and contains valuable information. I think that not only should every farmer have it, but every learner, too. . . . ."

COCCIDIOSIS OF CHICKENS.

P. RUMBALL, Poultry Expert.

Coccidiosis is probably the most destructive disease of chickens met with in Queensland. The disease, however, does not confine itself to this class of stock only, as adult birds are frequently affected in a chronic form, while well-developed pullets frequently go in the leg as the result of infection. With chickens from two to eight weeks, the disease assumes most serious proportions under favourable conditions.

The disease is caused by microscopic parasites, termed Eimeria Avium, which, when ingested by susceptible chickens rapidly develop and multiply in the walls of the intestines, and particularly the cæca or blind gut.

Symptoms.

The first indication of the disease is the tendency of chickens to bunch together, with closed eyes and drooping wings. On being disturbed they move about, apparently perfectly normal, with the exception that they appear to have exceptionally short backs. The tips of the wings, vents, and rear portions of the body are frequently stained with excreta. If an examination be made of the excreta of chickens, it will be usually found to be of a brick-red colour, due to the presence of blood. During the day or following morning some of the chickens will be found dead, and the number of shortened-backed, droopy-winged chickens added to. On opening up the chickens that have died, the upper portion of the small intestines is inflamed, and among its contents blood will be found. The inflammatory condition in chickens is usually more pronounced in the cæca, which is generally greatly distended and filled with blood, and in many cases the lining of the cæca will be found to have disappeared. Other organs are generally in a healthy condition.

The parasite responsible for this disease passes through many stages in its life cycle, the first being the egg stage. The egg of the organisms, known as an oöcyst, is voided from a diseased bird with the droppings. If again taken into the digestion tract of stock in that condition, no harm will result, but the conditions under which chickens are generally reared are such as to permit of sporulation, and when sporulated oöcyst gain an entrance to the digestion tract of susceptible chickens, a serious outbreak of disease is bound to result. When the sporulated oöcyst enters the intestines of the chicken another change takes place, and the parasite then commences to live upon the mucous lining of the intestine and cæca, undergoing several changes until the egg stage (oöcyst) is again ready to be voided with the droppings to undergo sporulation.

It is claimed by some authorities that the sporulated oöcyst will remain alive in the soil for a year or more; therefore, breeders who have been troubled with the disease should take precautionary measures to prevent its recurrence. It will also be readily understood how easily contamination can be spread from pen to pen by the organism adhering to the boots of the attendant, feeding, watering utensils, &c.

Treatment.

Medicinal treatment has been found to be of little use, therefore preventive methods should be adopted, and in outbreaks the worst cases destroyed. As the general stamina of the chickens is the best safeguard against serious infection, the arrangements for brooding purposes and the feeding of the chickens is of primary importance. Knowing that the first stage of the parasite—that is the egg or oöcyst before sporulation has taken place—is not harmful and that sporulation is only possible where there is sufficient dampness and warmth, brooding houses and runs should be as free from damp as possible. The congested condition under which chickens are reared naturally tends to foul the pens and brooders, and if the organism causing the disease is present, makes it a hotbed of infection; therefore, the thorough cleaning at frequent intervals is highly essential. The practice of scattering grain about the runs, highly desirable as a rule, should not be permitted when the disease is present, but grain and all food used should be fed in suitable receptacles that can be thoroughly cleansed once or twice a day.

The feeding of fresh skim milk and buttermilk powder have, to the writer's knowledge, checked outbreaks of the disease on various farms, but without the application of strict sanitary conditions, in conjunction with the milk feeding, very little good can be expected. If fresh skim milk is available, it can be used as the only form of a drink; whereas, with powdered buttermilk powder, it may be used for a few days pure until the trouble is checked and then used to form a definite proportion of the dry mash mixture. Buttermilk not only has curative properties in connection with coccidiosis, but is a splendid feed for both laying and growing stock, and poultry raisers could well make this food form a portion of their standard mash rations. As a sole source of animal protein in a mash, it could be used to the extent of 10 per cent., but when troubled with coccidiosis, the ratio could be considerably increased for two to three weeks and then reduced to normal.

Both liquid milk and buttermilk powder have the effect of causing the droppings to become of a very liquid nature, and consequently frequent cleaning is necessary.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING SEPTEMBER, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1927.	Sept., 1926.
North Coast.	In.		In.	In.
Atherton	0.72	26	0·28	2·81
Cairns	1·75	45	1·45	4·83
Cardwell	1·60	55	1·37	12·19
Cooktown	0·61	51	0·43	2·32
Herberton	0·51	40	0·17	0·94
Ingham	1·57	35	2·52	11·08
Innisfail	3·76	46	1·70	13·15
Mossman	1·67	14	1·14	6·25
Townsville	0·86	56	1·07	4·60
Central Coast.				
Ayr	1·56	40	0·95	4·66
Bowen	0·87	56	0·97	4·30
Charters Towers ...	0·79	45	1·02	1·96
Mackay	1·68	56	1·42	6·23
Proserpine	2·35	24	2·42	8·14
St. Lawrence ...	1·31	56	1·12	0·69
South Coast.				
Biggenden	1·64	28	1·47	1·37
Bundaberg	1·73	44	1·00	0·87
Brisbane	2·05	76	1·77	2·41
Caboolture	1·92	40	3·15	2·75
Childers	1·90	32	1·89	1·52
Crohamhurst ...	2·80	35	6·14	6·32
Esk	2·25	40	1·60	3·13
Gayndah	1·58	56	3·13	1·82
Gympie	2·17	57	2·41	3·72
Kilkivan	1·77	48	0·98	3·71
Maryborough ...	1·99	55	2·09	3·50
South Coast—continued:	In.		In.	In.
Nambour	2·56	31	6·97	7·36
Nanango	1·91	45	0·54	2·25
Rockhampton ...	1·40	40	1·39	5·26
Woodford ...	2·21	40	5·20	3·90
Darling Downs.				
Dalby	1·77	57	0·37	1·74
Emu Vale ...	1·90	31	0·29	1·09
Jimbour	1·60	39	0·68	1.77
Miles	1·47	42	0·25	1·43
Stanthorpe ...	2·40	54	0·51	0·73
Toowoomba ...	2·23	55	1·49	3·20
Warwick	1·88	62	0·61	1·25
Maranoa.				
Roma	1·54	53	0·56	1·74
State Farms, &c.				
Bungeworgorai ...	1·25	12	0·03	1·38
Gatton College ...	1·67	27	1·27	1·36
Gindie	1·13	27	0	1·57
Hermitage ...	1·68	20	0·68	1·24
Kairi	0·60	12	0·29	2·63
Sugar Experiment Station, Mackay	1·48	29	2·17	5·39
Warren	0·76	12	1·25	2·10

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,

Divisional Meteorologist.

The Columbia Portable Viva-Tonal Grafonola

that challenges the World at any Price!

The New COLUMBIA Portable at £9 9s. challenges comparison with any other portable AT ANY PRICE. The fullest test will show it to be far and away superior in Tone and Value. It is beyond question the finest portable Grafonola yet made. Enormous production alone has rendered such a reduced price possible. British throughout in every component part, its workmanship is of the highest possible standard, and its reproduction of records amazing in its beauty and volume. You are invited to hear and test it for yourself.

Never such Tone,
Never such Value,
£9 9 0

❧ ❧ ❧

Columbia Portable "Junior"

(No. 109) £6 6s. 0d.

A "Junior" Model Columbia Portable that represents another amazing standard in Value—no other portable Talking Machine offering such Tone or Quality at anything like this price. Shaped like an attaché case, and fitted with Carrier to take Eight 10-inch records.

PUT IT IN YOUR CAR.

Easy Terms. Catalogues free

Palings

Established 1853.

BRISBANE
TOOWOOMBA
ROCKHAMPTON
TOWNSVILLE

There is Money in Trees!

By Investing in the Largest Commercial Company in the World.

N.Z. Perpetual Forests Ltd.

PAID UP CAPITAL	£128,650
BOND CAPITAL EXCEEDS	£2,250,000
TRUSTEE RESERVE FUNDS representing One-third on all fully paid Bonds to 1st July, 1927	£52,641

Like all Successful Companies, Imitators speedily arrive, therefore the ***public are warned*** *not to confuse the securities and protection of the* ***N.Z. PERPETUAL FORESTRY Ltd.*** *with any other Forestry Company.*

Write for Illustrated Booklet.

Smith, Wylie & Co. Ltd., Griffith House, Brisbane.

Name...

Address...

BRUNNING

BEST FOR BEARING

FRUIT TREES

(True to Name and Healthy)

are planted throughout Australasia. Apples, Pears, Plums, Peaches, Nectarines, Quinces, Mulberries, Oranges, Lemons, etc.

Shipments made to all Parts of the World.

JOHN BRUNNING & SONS

Established 60 Years

SOMERVILLE NURSERIES

SOMERVILLE, VICTORIA, AUSTRALIA

Chicks-Chicks-Chicks

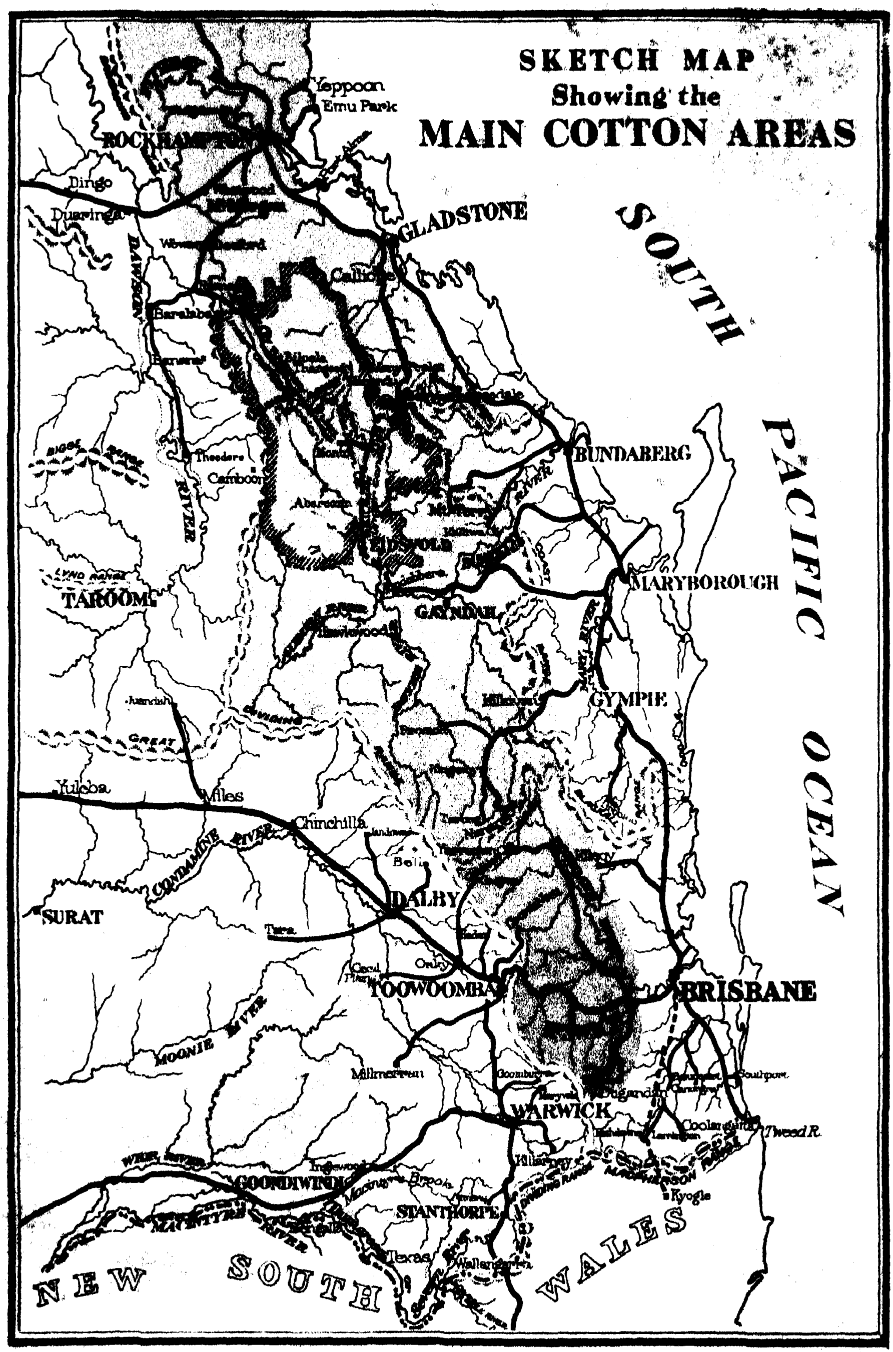
Day-old Utility

Black Orpington and White Leghorns

From World's record laying strain. We are now booking orders for delivery from June to October. £5 per hundred, £2 10s. for fifty, 15s. per dozen; special quote for larger quantities. 10s. per 100 secures booking, freight paid. Instructions for feeding, etc., supplied with every order. Also settings 7s. 6d. Stock for sale. *Square deal guaranteed.* *Correspondence invited.*

Woodlands Poultry Farm

Beerwah, Queensland


SKETCH MAP
Showing the
MAIN COTTON AREAS
SOUTH PACIFIC OCEAN
Yeppoon
Emu Park
ROCKHAMPTON
Dingo
Duaringa
GLADSTONE
Calliope
DAWSON
Baralaba
Banana
Theodore
Cracow
RIVER
Abercorn
EIDSVOLD
Monto
BUNDABERG
MARYBOROUGH
TAROOM
GAYNDAH
Biggenden
GYMPIE
Juandah
Yuleba
Miles
Chinchilla
CONDAMINE RIVER
Bell
DALBY
SURAT
Tara
Oakey
Cecil Plains
TOOWOOMBA
BRISBANE
MOONIE RIVER
Millmerran
Southport
WARWICK
Coolangatta
Tweed R.
Killarney
Kyogle
Inglewood
GOONDIWINDI
STANTHORPE
Texas
Wallangarra
MACINTYRE RIVER
NEW SOUTH WALES

COTTON GROWING IN QUEENSLAND.

PART I.

Cotton Cultivation.

By W. G. WELLS, Cotton Specialist.

The history of the initial stages of the development of the cotton-growing industry in Queensland has been described in former papers on this subject.[1] It is proposed in this bulletin to discuss the more important phases of the cultivation of the cotton crop, the insect pests which attack it, the methods of controlling them, and the present status of the industry.

During the period of the existence of the Commonwealth and Queensland Governments' system of guaranteed advances on seed cotton which expired at the end of the 1925-1926 crop, a great portion of the agricultural sections of this State was tested as to the suitability for growing cotton. As was to be expected with a comparatively new industry, many of the tests were made on unsuitable soils or in areas of adverse climatic conditions. The general results secured, however, from these experimental plantings, both by co-operators with the Department of Agriculture and individual farmers, have been of inestimable value in determining what districts are the most suitable for producing profitable crops.

It may be said then that the industry has passed through the investigational stages in this respect, and that the areas in which the cotton crop will return profitable yields have been fairly well ascertained. Generally speaking, they lie along the slopes and medium alluvial loamy flats of the valleys of the eastern watershed of the Great Dividing Range, from north of Beaudesert in the south to the Fitzroy River and areas adjacent in the north, and lying in behind the coastal ranges from Brisbane to Gladstone and thence north to Rockhampton. This covers an area of some 400 miles long by 50 to 150 miles wide.

The accompanying map roughly shows the areas.

CLIMATE.

Temperature.

The climate through most of the Cotton Belt may be described as normally suitable for the production of heavy-yielding crops of cotton. The period usually free from frosts, with the exception of a few small areas, commences during the first half of September and extends until at least the end of April. Light frosts may be experienced at this stage in some seasons, especially in the inland areas occurring at altitudes of 400 to 600 ft. or higher above sea-level. Frequently no frosts are experienced before the middle of June over the whole of the belt, so it can be seen that a long growing period usually exists.

---

[1] Cotton Cultivation: H. C. Quodling; Bulletin, Department of Agriculture and Stock, 1922. Cotton Cultivation: W. G. Wells; Bulletin, Department of Agriculture and Stock, 1923.

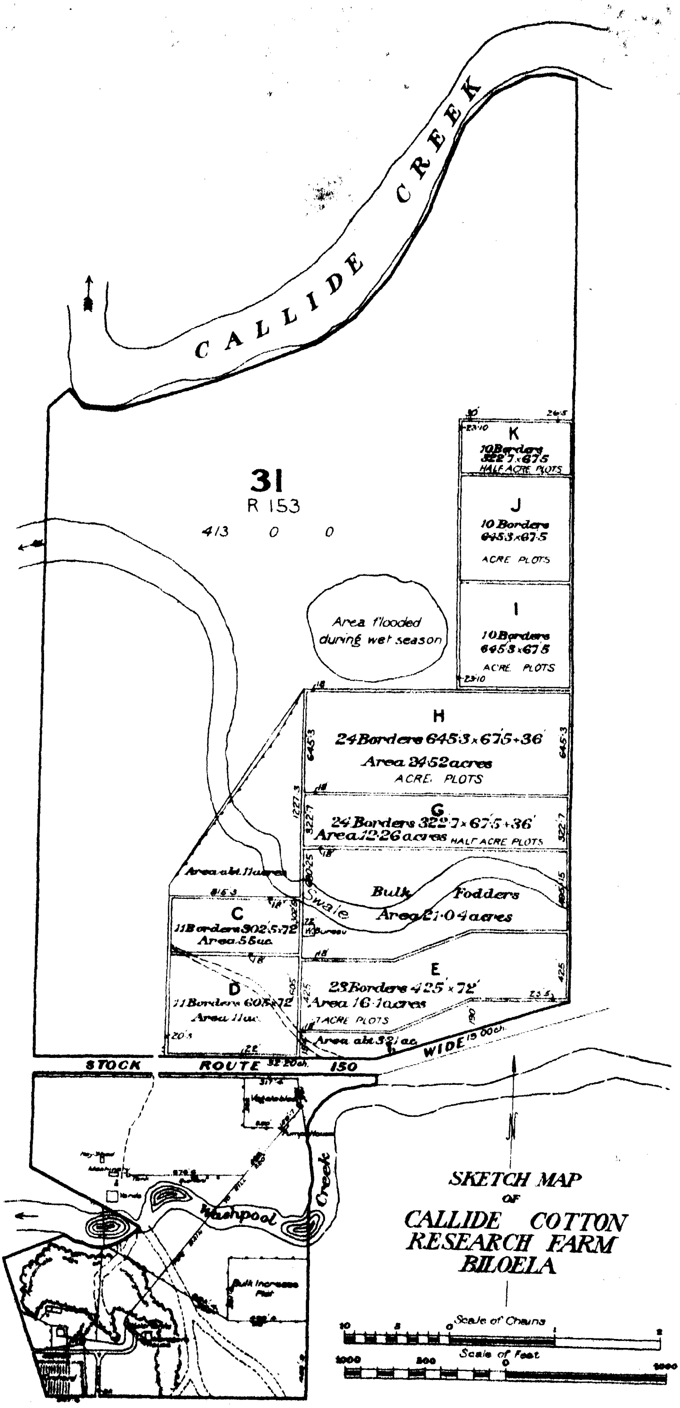
The daily temperatures during the growing period range from a minimum of 45 to 55 and a maximum of 75 to 80 in the spring, to a minimum of 60 to 75 and a maximum of 85 to 100 in midsummer with an occasional day over 100. During the higher temperatures there is usually a low amount of humidity, so that, while hot, no excessive discomfort is felt. These temperatures cover the average of the belt, although in some of the areas of the higher elevations the figures will be lower throughout the season, especially at night. During the harvesting season the maximum temperatures lessen rapidly so that the bulk of the crop is picked normally in delightful weather.

Rainfall.

Sufficient rainfall generally occurs during the latter half of June and in July to enable well-prepared seed-beds to be established if the operations are performed at the proper time. August usually is dry until near the end of the month, when scattered to even general rains normally are experienced over most of the Cotton Belt. These precipitations of a scattered nature may continue through the early half of September, but after that period only isolated storms can be expected until November, when a series of thunderstorms usually occurs in nearly all of the districts. The main summer rains normally commence in December and continue at varying intervals through January, February, and the first part of March. From then on until June a period of clear hot weather in the day and gradually increasingly cooler nights ordinarily exists, which provides a nearly perfect harvesting season. This is shown by the high percentage of the top grades which are obtained, fully 75 per cent. of the crop usually being of the World's Universal Standard grade of Strict Middling or better, with a large amount equalling the grade of Strict Good Middling cotton.

The average total yearly rainfall varies somewhat in the different districts, but may be described as ranging from 22 to 35 in., with the greater portion of the belt receiving about 28 to 30 in. Unfortunately these amounts may include falls occurring during storms of a tropical nature when 4 or 5 in. may fall in two or three hours, in which case little benefit may be received.

The record for 1925-26 at the Callide Cotton Research Station is included as an illustration of the nature of the distribution of the rainfall which may be experienced over many of the cotton belts.



SKETCH MAP
OF
CALLIDE COTTON RESEARCH FARM
BILOELA

DAILY RAINFALL, CALLIDE RESEARCH FARM, 1st JULY, 1925, TO 30th JUNE, 1926.

Day.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1 ..	..	..	..	..	..	36	267	..	..	..	..	2
2 ..	..	..	..	..	..	..	3	..	..	..	..	..
3 ..	..	..	..	..	4	11	60	..	..	..	..	..
4 ..	25	..	..	..	..	..	24	..	..	..	..	..
5 ..	..	..	18	..	75	11	..	..	..	..	..	..
6 ..	..	..	..	..	..	..	169	..	..	4	..	..
7 ..	..	..	..	..	..	..	9	..	..	..	..	79
8 ..	..	..	..	..	..	..	455	..	..	..	..	..
9 ..	..	..	..	..	141	..	..	..	..	..	..	..
10 ..	..	..	..	18	4	..	..	457	33	..	..	..
11 ..	58	..	..	..	..	..	..	86	36	..	2	..
12 ..	..	..	..	..	..	..	..	37	..	5	13	..
13 ..	..	..	..	..	..	..	..	68	..	..	2	..
14 ..	..	..	..	..	6	..	..	..	..	..	..	..
15 ..	..	..	..	..	..	96	..	..	..	6	6	..
16 ..	..	..	137	..	..	35	..	..	..	..	6	..
17 ..	..	..	52	..	..	..	9	..	..	..	195	..
18 ..	..	..	..	..	..	..	14	..	..	..	..	..
19 ..	..	..	..	..	..	..	..	..	..	..	..	..
20 ..	..	..	..	..	..	..	9	..	..	..	..	2
21 ..	..	..	..	..	..	..	..	..	..	..	..	..
22 ..	..	..	..	..	54	..	..	..	..	..	..	..
23 ..	..	..	..	..	..	..	..	..	..	..	..	..
24 ..	..	..	5	..	..	135	..	..	..	..	..	65
25 ..	..	..	..	..	..	..	..	65	..	..	..	15
26 ..	13	..	..	..	..	..	..	..	..	..	..	..
27 ..	..	..	..	..	..	..	..	..	..	..	..	..
28 ..	..	..	..	..	..	..	..	..	..	..	..	..
29 ..	..	29	..	..	..	..	..	..	..	..	..	..
30 ..	..	10	..	..	..	22	..	..	..	..	..	..
31 ..	..	..	..	..	..	47	..	..	..	..	40	..
Monthly Total ..	96	39	212	18	284	393	1,019	713	69	15	264	163

Yearly total—32·85 inches.

SOILS.

The cotton plant appears to be able to adapt itself to a wide range of soils, but the experiences of the farmers of Queensland during the last five years seem to indicate that certain soils are far more suitable than others. It must be remembered that climatic conditions play an important part in deciding the suitability of a soil for the producing of a heavily laden cotton plant. The time of planting of the crop is also a deciding influence.

Suitable Soils.

Given a moist subsoil, an early-planted crop of cotton may produce a very profitable yield with the proper climatic conditions, on several classes of the soils found in the Cotton Belt of Queensland. These include the rich alluvial creek loams; the grey and the brown scrub soils; the sandy loamy slopes and ridges with a clay subsoil and which originally were covered with a combination of the narrow-leaf ironbark, the Moreton Bay ash, and good-sized bloodwood trees; the brown forest soils; and the apple-tree sandy-creek flats.

It is when some of the necessary factors are absent that difficulties in obtaining profitable yields are encountered. Generally speaking, it may be safe to assume, when the crops are planted late, that in districts which are liable to receive heavy rains in January and February it is wise not to plant on soils that do not have a good drainage or which are of exceptionally rich fertility. The difficulty with late-planted cotton is to have the plants sufficiently laden to control the growth on fertile soils under luxuriant growing conditions. The general experience has been that the gravelly loamy slopes are better suited for such crops, as the plant makes a slower, stockier growth with a consequent heavier setting of fruit. In the Callide Valley, the clayey loamy soils occurring at the junctioning of the loams and the box-tree clay flats appear also to be well suited for late-planted cotton. Such a plant is not so likely to develop an excessive vegetative growth at the expense of the crop of fruit when excessive rainfall occurs. As early planting rains do not always occur in some areas, it can be seen that this is a very important factor, and one that every farmer should investigate on his own place in order to know what to do when such conditions arise.

Unsuitable Soils.

The consensus of opinion of most farmers who have experimented with growing cotton on the heavy black soils of the creek flats, such as in the bottom of the Lockyer Valley and in districts of similar nature, is that they are not suitable for cotton culture unless under exceptionally favourable conditions. Where good winter rains have fallen on an early prepared seed-bed, so as to put ample moisture in the subsoils, heavy yields from early-planted crops may be secured. The great difficulty with such soils is that they are difficult to cultivate during periods of showery weather after the crop is up. The pigweeds, convolvulus, and various other weeds difficult to eradicate by machinery when once established, particularly infest these classes of soils, and if the cotton crop is planted late the control of the weed growth often becomes a very expensive item.

The red softwood scrub soils have as a whole proved to be unsuitable for cotton production over any length of time. Analyses of such soils have nearly all shown that they are lacking in phosphates or potash and sometimes both. The usual results obtained from such soils have been good or even excellent crops the first two years after the scrub has been burned, but where cotton crops have been planted on old cultivated paddocks of these soils the results often have been extremely unprofitable.

SIZE OF COTTON AREAS.

Although the area marked on the enclosed map indicates that a large section of country is suitable for cotton-growing, only a small portion of it actually has been in cotton. During the years 1921-26 inclusive, the maximum area harvested in any one year was approximately 40,000 acres. The tendency of many of the growers has been to limit their acreage to such as they can cultivate without employing labour other than that necessary to harvest the portion of the crop which the grower and his family could not pick. Under such a system the average cotton plot in the older settled areas has varied from 5 to 15 acres, with the majority around 10 acres. In the newer areas, especially in the sections some distance from butter factories or markets for farm products, the acreages have varied from 20 to 100 acres, as the grower has concentrated his labour on cotton-growing. It is believed, as the farmer becomes more familiar with cotton-growing, and sees the advantage of using machinery which will effect the most economy in labour, that the individual acreage will increase in size. This enlargement of the individual acreage is desirable, as it not only decreases the cost of production but increases the chances of improving the uniformity of the bale of lint. The growers of the larger acreages send in more cotton in the one consignment, which enables the ginning to be performed with the least amount of mixing of styles of fibres. This also tends to decrease the cost of overhead expense in the various activities at the ginnery, and should be practised wherever possible.

It is not considered advisable to grow only cotton unless the problem of marketing eliminates other crops. Nearly all of the areas where cotton is being successfully grown can grow other agricultural products which may be utilised in dairying, pig-raising, &c. Where cotton-growing is combined with such industries, it may be considered an excellent cash crop which fits into nearly every rotation which can be practised to advantage. This feature makes it appear that every farmer in the areas where cotton can be grown profitably should include this crop in his regular plan of operations. Over a series of years it is believed that the returns per acre received from it will compare favourably with the other crops that can be grown in the ordinary agricultural areas of the State.

FARM EQUIPMENT.

A large percentage of the cotton-growers was already established on farms in the agricultural districts before the increased interest in cotton-growing occurred in 1921-22. In many cases the farms were equipped with only walking scufflers, single-row planters, and such machinery which the usual small "mixed farming" type of place would have. The farmers naturally have endeavoured to grow the cotton crop with this equipment. On some lands these implements, with some modifications, have been about as suitable as could be used, especially on the slopes or in small irregular plots. Where the land is suitable to the use of riding cultivators and two-row planters, it is believed that the greater efficiency of these machines justifies their purchase. In order to reduce the cost of interest and depreciation per acre and also to obtain the full benefit of the efficiency of these implements, it is necessary that the grower should have at least 15 to 20 acres of cotton. It should be realised that such equipment is suitable also to the cultivation of the other ordinary farm crops that the average cotton-grower can grow, and the use of it reduces the expense on such crops as well.

Reducing the cost of production is an important problem in cotton-growing in Queensland, and every device which can effect this result should be utilised. Labour-saving machinery can be employed to great advantage on the average cotton farm of this State. One man with a one-horse scuffler can cultivate an average of approximately 3½ to 4 acres a day, whereas with a two-horse riding cultivator he can cultivate up to 7 acres a day and do better work as well. A double saving is effected in the one operation with the riding cultivator, in that more area is covered per man per day and the points of the riding machine can be set close to the row, which enables the destroying of more weed growth than where the one-row scuffler is used. In this respect it is preferable to use a pivot or driver steered machine to one of the rigid tongue type, with which the steering is done by directing the horses. Unless the team is evenly gaited and used to such work, it is exceedingly difficult to steer the implement when the inner points are set close enough to remove weed growth near the plants. With a machine which is steered by the driver, excellent work can be performed within a few inches of the plants without the slightest damage to them. Several types of these machines are on the market in this State now, and the growers should use them.

The use of the two-row split-wheel type of combination maize and cotton planter is also of decided advantage. A man with a one-horse single-row planter can plant from 4 to 6 acres a day, whereas with a two-horse two-row planter he can plant 10 to 14 acres a day depending on the speed of his horses and the length of the rows.

This is of marked advantage in districts where the spring rains are somewhat precarious. Frequently planting has to be done following a fall of 50 to 60 points of rain. Speed is a big factor in the success of the operation under such conditions, and the quicker performed the more likelihood of success, especially under the windy conditions which often prevail at planting time.

Another decided advantage obtained by the use of this type of planter is that the planting is effected more uniformly than with some of the combination planter-cultivators on the market. Having the planting spouts with disc openers just ahead of the wheels tends to insure the spout and the press-wheel being more in the same plane than where the spout is some distance from the wheel, as in the other types mentioned. The split-wheel appears to be of the utmost importance where planting is effected following a storm of some 50 or 60 points of rain. The packing action of the rims of the wheel on the sides of the seed rather than on the top insures the seed being in firm moist soil and at the same time leaves a loose mulch on top to prevent evaporation. As the weight of the machine and the driver is borne by the rims which press the soil against the sides of the seed, it can be seen that a decided firming of the seed-bed directly under the seed is also accomplished, which assists in making contact with the moisture of the subsoils.

Where the acreage to be planted is too small to warrant the purchase of a two-row machine, the grower may secure very good results with some of the single-row split-wheel planters. These machines utilise the same principle of covering the seed, but may be somewhat light for obtaining the same pressing effect around the seed. This can be effected by carrying a partly filled sack of seed on the back part of the frame.

PREPARATION OF THE SEED-BED.

The uncertainty of the winter rains is the most disturbing factor in the growing of cotton in Queensland. In some seasons they are very light, and, unless the seed-bed is prepared early so as to receive the full benefit of such rains, difficulty may be experienced in maintaining a stand during the dry, windy period of October, owing to the lack of subsoil moisture. The initial stage of the development of the young plant usually occurs in this month, and, unless there is sufficient moisture to enable the developing tap-root to supply the tender plant's requirements, serious losses may be experienced. Early, properly prepared seed-beds can discount this factor to a great degree, however, as has been demonstrated by large numbers of farmers who have obtained good strikes every season and at the Callide Cotton Research Station, where very little difficulty is ever experienced in this respect. Nevertheless it is a serious problem, and the cotton-grower should recognise it as such and endeavour to prepare the seed-bed at the earliest possible period in order to take full advantage of any winter rains which may occur.

Where the new crop is to be planted on land which is in cotton, it is believed that greater benefit is to be obtained by cutting down the plants by the middle of July at the latest. There may be a fair top crop of green bolls on the plants at that time, but investigations over the last few years have shown that a considerable proportion of these bolls contain stained cotton caused by fungus diseases in conjunction with attacks of the sucking insects (*Dysdercus sidæ* and *Tectacoris lineola*). Attacks by the peach moth grub (*Conogethes punctiferalis*) and the pink boll-worm (*Platyedra gossypiella*) also may destroy a considerable percentage of these late bolls, so that the grower will often be disappointed in the amount of good cotton which he obtains from what appears to be a fair top crop of bolls.

Where the grower has a dairy the cows may be turned into the field after the last picking, so that they can feed on the green bolls and squares and thus destroy any insect life which may be present in them. When this is completed, the stalks should be cut and burned as soon as sufficiently dry.

The cutting of the stalks can best be effected by means of a slide with knives on each side. This machine, which is similar to the maize slide-cutter, can be made on the farm, and requires but two worn-out crosscut saws. These are ground to a knife edge, and holes bored through which to bolt the blades to the slide.

The ploughing of the land should be performed as soon as possible after the burning of the stalks. In some districts the soil may be exceedingly dry and hard, but it is believed that the ploughing should be done as soon as the crop is cleared off, so that the full benefit of any rains falling during July may be obtained. In case the soil breaks up very cloddy, an efficient roller can be made of a tree-trunk with iron spindles and a frame set upon these.

Depth and Number of Ploughings.

There appears to be a diversity of opinion in regard to the depth and the number of times of ploughing. Some growers contend that one ploughing is sufficient, and in this school of thought the recommended depth may range from 6 to 12 inches; the advocates of the deeper ploughings maintaining that a deeply ploughed soil offers more opportunity of storing moisture for the plant's requirements later in the season. This might be true if the winter months usually received sufficient rainfall to moisten the ploughed bed to the subsoil. Unfortunately most of the Cotton Belt does not receive such rain, and the deeper the ploughing, if made in the winter, the greater may be the width of a dry zone of loose earth overlying the subsoil at planting time. Other growers maintain that two ploughings are necessary to thoroughly prepare a proper seed-bed. This may be so where the land is grassy, when a shallow ploughing will be required at first to expose the roots and then later a deep ploughing to turn everything under. For ordinary conditions it is believed that two ploughings are not necessary and the amount of labour expended would be better utilised in harrowing and sometimes rolling to firm the seed-bed.

From results obtained at the Callide Cotton Research Station on alluvial clayey loams, it appears that one ploughing of 6 or 7 inches in depth is all that is required on old cotton land. The land is then rolled to firm it and break up any large clods, and then harrowed so as to leave a deep mulch. Harrowing is performed after all rains, and by planting time the seed-bed is generally of a firm, compact nature underneath but with a decided springy feeling on top to one walking over it. Fifty points of soft rain will give a splendid strike on such a soil, as only a shallow harrowing is made after the planting rain, with a lever harrow with the teeth set back at a fair angle. This leaves a nice mulch on top and yet does not stir up the seed-bed under the surface.

Where the land is trashy or weedy to such an extent that it appears desirable to plough twice, it is suggested that the last ploughing should be made at least a month ahead of planting time. This allows the soil to settle and firm the seed-bed. From observations made in various districts, it is believed that a great deal of damage is done each season in the Cotton Belt by late cross-ploughing. Cases have been observed where such ploughing was being performed from which the only result to be obtained was the loss of what moisture there was in the surface soil. With as scant a winter rainfall as has most of the Cotton Belt, it appears only reasonable to believe that the less the lower soils of the seed-bed are disturbed after the first ploughing, the firmer the seed-bed will become. Numerous examples have been noted where planting has been made following 50 to 60 points of rain falling on a late prepared, loose seed-bed. The seed germinated and grew well where subsequent rains wet up the lower soils, but where droughty conditions prevailed the young roots soon penetrated to the dry layer of loose soil lying on the subsoil, and the strike was badly depleted during periods of hot, burning winds which occurred in late October and early November. In the same district and on similar soils which had been prepared in the manner which has just been suggested, not only were excellent stands maintained through such periods, but the young plants made splendid progress, which showed that they quickly penetrated through the firm seed-bed into the moist subsoils.

PLANTING.

Methods.

As has been pointed out, planting operations can best be performed by the split-wheel type of planter equipped with disc-openers on the seed-spouts. On the Cotton Research Station excellent strikes have been obtained each season with this type of machine while farmers in the same district have only been partially successful with other types of machines, or where good strikes have been secured, have experienced the dying out of sufficient plants during periods of hot dry weather to affect materially the ultimate stand. It is believed that the pressing of the loose soil around the seed firms it to such an extent as to enable the lower moisture to rise to around the seed, and thereby assist in the development of the root system of the young seedling in the early stages.

Nearly all other types of planters lack this feature, as the seed is usually dropped in a shallow furrow made by single or double disc-openers and then covered by means of scrapers. The weakness of such a system can be seen in that there is no firming of the soil around the seed, and therefore no aid to assist the movement of the ground moisture.

In some of the districts where the individual acreage of cotton is generally so small as not to warrant the purchasing of a cotton planter, the custom is to plough out shallow furrows with a single-furrow plough and then drop the seed by hand in the bottom of the furrow. The seeds are then covered by means of a one-horse scuffler with the frame closed up so that the teeth work in the moist soil on the sides of the furrow. This method gives good results if the soil is well moistened and the covering is made at a uniform depth. It is believed that the best results will be secured if the scuffler has a wheel attachment in front running on top of the seed. This presses them on to the firm, moist soil below and also assists the operator in covering at a more uniform depth. The main feature of this method is that the planting and covering should be done immediately behind the ploughing of the furrow in order to avoid loss of moisture.

A modification of this system is used where the winter rains have not occurred. The furrows are ploughed in the dry seed-bed and left open for the fall of the planting rains. Upon the occurrence of these, the seed are distributed along the bottom of the furrow and then covered by means of the one-row scuffler. This leaves a shallow depression where the row is, and it may be that this is of advantage in a dry windy spring, as some protection may be afforded from the winds.

Another method of planting frequently used by the farmers in the drier areas is to plant the seed in a dry seed-bed, with the idea that a strike will be obtained in case of only light falls of rain occurring. This may be a wise procedure where a farmer is growing large areas and has a limited amount of labour with which to effect the planting. In such circumstances, by planting dry he is assured of obtaining the full benefit of a light storm. However, there are dangers associated with this system which should be considered. In the first place, a fall of 20 or 30 points of rain usually means that the seeds start swelling and then, owing to the drying out of such a small amount of moisture, further development ceases with a consequent rotting of the seed. Another feature is that if a germination is secured with a light rain there is danger of a considerable loss of stand occurring unless rain falls soon after the seedlings appear above ground, owing to the lack of moisture underneath prohibiting the development of a proper root system. In such a case the chances are that, if part of the stand has been lost before the necessary rain comes, the grower will be inclined to carry on with the plot, and therefore be handicapped all season from obtaining the full possibilities of his soil. Under the best of conditions this method is a gamble, and it is believed that if more attention is paid to the early preparation of the seed-bed it will not have to be resorted to.

Depth of Planting.

In all probability more loss occurs in the cotton-growing industry in Queensland through the lack of proper stands than by any other cultural factor. Without a full stand the grower cannot receive the proper benefits of his labours, no matter how skilful a grower he may be. It therefore is most important that every effort should be made to obtain as near a perfect strike as possible.

One of the main causes of failure in securing a proper strike is the incorrect depth of planting. In average soils and under the climatic conditions which usually exist in Queensland at cotton-planting time, sound seed covered to a depth of 1½ inches in a moist, well-prepared seed-bed should give an excellent strike unless heavy crusting rains occur before the seedlings come through the surface. When such storms occur it is advisable usually to harrow the land thoroughly and replant rather than wait for the first planting to come through.

Examinations of scores of fields where irregular germination was occurring have shown that it is very seldom that the seed is at fault, but that the depth of planting has been non-uniform. The result has been a series of gaps in the rows, of variable distances in length. In most cases where the seed-bed had been well prepared the fault has been too deep a covering, as shown by the young seedlings having died just before the seed-leaves pushed through the surface. A cotton seedling is only capable of pushing up through a certain depth of soil, and will die unless it gets through this soil in the proper time, even if fully developed. Frequently very pale, yellowish green, small-leafed seedlings may be seen in rows which have been covered by some form of scrapers to ridge the soil over the seed. Examination often shows that these seedlings are of exceptional length between the top lateral roots and the seed-leaves, which indicates that the seed was at too great a depth under the surface.

Generally speaking, the depth of covering is usually too great, especially in the early plantings. In nearly every field one can see instances where the seed which spilled out of the hoppers at the ends of the rows has been the first to germinate. This affords an excellent illustration of the results to be obtained by shallow planting in a firm soil, and should be ample evidence of the necessity for the preparation of the seed-bed so as to approach similar conditions.

Seed Rate of Planting.

The average grower does not plant enough seed to insure that a good strike will be secured. This has been brought about by several factors, all of which are non-operative at present with the main supply of seed, and the practice should be discontinued in favour of heavier planting rates. When the increased interest in cotton-growing first assumed considerable proportions, it was necessary to restrict the planting rate owing to the limited amount of seed. This condition was improved somewhat in later years, but with the development of the Durango variety it was necessary to decrease the planting rate from 12 and 15 lb. to 10 lb. of seed per acre owing to the limited amount of seed.

The growers, under favourable planting conditions, were able to obtain good commercial strikes with such planting rates. This, in conjunction with the fact that they were learning the necessity of spacing the plants farther apart in the thinning operations, and thereby necessitating the removal of large quantities of plants, caused the growers to think that 10 to 12 lb. was a sufficient rate of planting. Under suitable climatic, soil, and cultural conditions a good strike may be obtained with this planting rate, but the absence of any of these factors may affect the germination to such an extent as to prevent the grower from obtaining the full returns which his soils are capable of producing.

The experiences of the Government Experimental Stations have been that, while under favourable conditions a good strike may be obtained from a planting rate of 10 lb., it is of decided advantage to plant 20 lb. per acre. The extra amount of seed insures that a strike will be obtained which will enable nearly a perfect stand to be left in the thinning operations. This is especially true where heavy storms occur just before the seedlings push through the surface. The larger amount of seed gives the necessary thrusting power to break any crust which may form, whereas with the lower planting rate it is only where there are bunches that there is sufficient power to push through in case of a crust forming.

A planting rate of 20 lb. of seed to the acre gives a strike which may seem to be entirely unnecessary and which will entail considerable work in the thinning operation. It is believed, however, that it is far better to have such a strike which requires considerable thinning and allows a perfect spacing of the plants, than to have a patchy stand which requires but a small amount of work at thinning and does not return the maximum yields through lack of the proper number of plants. It has been found that in some seasons cotton seed is badly damaged by sucking bugs, and when used for planting the following season germination is poor. (*See* Part II., plate VI.) This also adds to the necessity for a heavy planting rate.

Time of Planting.

The consensus of opinion amongst the growers and the results secured in experiments on the Experimental Farms all seem to agree that early planting is desirable. By early planting it is meant that planting should be done following the first rains falling after the soil has warmed sufficiently to maintain a growth of the seedlings, and that usually there will be no danger of frosts being experienced. In most of the cotton areas of Queensland this condition generally occurs by the middle of September, although in a few of the inland areas of some altitude the end of the month may be more suitable. Planting can continue on until the end of the first week in November if the moisture conditions are favourable, and good yields may be secured. After this period the yields decline rather rapidly with the later planted crops. This is especially so in the inland areas, as shown by the time of planting experiments at the Government Experiment Stations in the season of 1924-25.

YIELD OF GOOD-QUALITY SEED COTTON PER ACRE.

—	Planting in—				
	September.	October.	November.	December.	January,
	lb.	lb.	lb.	lb.	lb.
Monal Creek Demonstration Area	2,184	1,543	1,120	Not mature	Not mature
Callide Cotton Research Station	..	912	885	220	Not mature
Callide Cotton Research Station, 1925-26	..	..	933	116	..

In the regions where frosts do not occur until July or August and then of only a light intensity, December plantings may yield satisfactory returns, but they rarely compare with those obtained from the earlier plantings.

The reasons for the earlier plantings yielding better than the later ones appear to be that the plants of the September and October plantings make a slow growth until the December rains begin. Apparently the cool nights which usually occur during this period of the year and the dry weather of October and November tend to restrict the development of the plant so much that it becomes of a toughened woody nature rather than of a succulent one. An excellent tap-root is developed as well, which enables the plant to withstand periods of drought later in the season. The plant develops a fruiting rather than a vegetative system under such conditions, and the December rains seem to stimulate the growth of the fruiting structure more than a tendency to vegetative development, even under the occurrence of fairly heavy rainfall. Apparently, once having developed this form of structure, very unusual conditions are necessary to affect it, and, while heavy rainfall may cause the development of a large plant, there is a corresponding amount of fruit borne, so that the larger plant really means a greater crop of bolls.

This feature does not hold true with the late-planted cotton. Usually only a short period of growth occurs before the beginning of the December rains. Consequently the plants are of a semi-succulent nature and the occurrence of the rains intensifies this condition. The result is a rapid growth of an elongated nature both in the main stalk and in the fruiting branches. A vigorous development of vegetative branches usually occurs, which is detrimental to any lower crop of bolls which may be present, owing to the excessive shade which is caused by the increased number of vegetative branches and the size of the leaves thereon. Unless a plant of such nature receives a very severe check by drought it is extremely unlikely that any but a very late top crop will be realised.

Such plants are also more subject to attack by such insects as the corn ear worm (*Heliothis obsoleta*). This insect apparently prefers the young squares of the late-planted crop to that of the earlier-planted cotton. As the appearance of the heaviest emergence of the grub of this insect occurs at the most critical stage in the development of the late-planted cotton, i.e., around the middle of January, it can be seen that an added danger lies in growing such a crop.

The season of 1926-27 has given some results in late-planted cotton which may be of decided value. In this season most of the growers in the Callide and the Dawson Valleys could not obtain stands of cotton until the middle of December. Ordinarily crops planted in this period of the season would have returned very little yield. Such was the case in crops planted on alluvial soils—that of the Callide Research Farm yielding practically nothing. The growers who planted on the clayey loamy soils, where the box-tree clay flats and the alluvial loams intermingle, obtained as much as 700 lb. of cotton to the acre. The explanation seems to lie in the fact that such heavy rains fell in January that the pores of the soil became waterlogged, thus causing a ''physiological drought'' effect on the plants. The result was a decided checking of the growth of the plants, and after a two weeks' heat wave in February the resumption of heavy rains produced a very good crop of cotton rather than a rank vegetative growth as might have been expected. This phenomenon should be borne in mind, and all growers should experiment under as nearly comparable soil conditions as possible in case a similar situation arises again.

Spacing of Rows.

There is no definite data from which to determine the correct distance to space the rows. In the earlier crops of the period from 1919 on, the general practice was to plant the rows 4 ft. apart. The experiences of the growers were that on most soils this distance was somewhat unreliable. In seasons when heavy rains fell during December and January, such a rank growth of plant was liable to develop that the space between the rows was entirely grown over. The sunlight under such conditions could not penetrate through the luxuriant foliage sufficiently to prevent excessive humidity existing around the lower portions of the plants. The result was severe losses of the lower crop due to external boll-rots.

In an attempt to overcome this condition, the space between the rows was widened to various distances varying from 4 ft. 3 in. to 6 ft. A majority of the growers have decided finally that 4½ ft. seems to be the most suitable for average conditions, and the bulk of the crop is planted accordingly with such spacing. The yields obtained and the quality of the cotton produced indicate that this space for the average conditions of the Cotton Belt may be relied upon ordinarily to give good results, other factors being normal.

It may be that certain soils will require different spacing. A method is being investigated at the Callide Cotton Research Station in which the ''outside row effect'' is incorporated. Usually the outside rows of a plot of cotton yield heavier than do the inside rows. In the United States, this factor has been recognised and has been obtained throughout the field by means of planting the rows in pairs in which the distance between the two rows of a pair is somewhat less than that between the pairs. The use of this method has been found to be of advantage in controlling the growth in irrigated cotton fields where boll-rots may cause serious losses.

Such a system may be of advantage on some of the rich alluvial soils of Queensland in districts where heavy rainfall may occur in January or February. Experiments are being conducted along these lines using distances of 4½ ft. between the two rows of a pair and 5½ or 6½ ft. between the pairs. No uniform results have been obtained to show that there is any advantage to be gained by such spacing. It is suggested that the growers who have soil and climatic conditions where this method may be of advantage should experiment along such lines in order to determine the value of such for their particular soils.

CULTIVATION.

The operation of cultivating a cotton field does not receive always the amount of attention that should be given to it. This is not an expensive operation if properly done, yet the number of times that a cotton crop has to be cultivated in a season makes it necessary that each cultivation should be as efficient as it is possible to attain. One frequently sees machines equipped with the wrong points or ones requiring sharpening, &c. Attention to such details often reduces the cost of production to a marked degree, and it is stressed that the grower should study his machine and see if it is properly equipped before using it.

The most efficient cultivation can be obtained with the riding two-horse cultivator which is steered by the driver. In such an implement the carriage on which the points are fastened works independently of the main structure of the machine. Instead of controlling the carriage by directing the horses, the steering is done directly by the driver in conjunction with the horses, through control of the wheels or of the carriage itself. There are several types of this form of cultivator on the market, and the growers should investigate them and see the advantages to be obtained by using them.

Usually such machines are adaptable to the use of disc attachments, hillers, duck feet, or sweeps of various sizes and the ordinary tines. All of these points, with the possible exception of the discs, are required in the average field of cotton, and to attempt to cultivate a crop without them usually means that at some stage in the operations an inefficient cultivation is made. These points can be used on the one-horse scuffler as well and to some extent on the combination planter-cultivators, but neither of these machines, of which there are several types, allows the careful work close to the plant that the above-mentioned type of cultivator will do.

It is the degree of efficiency with which the cultivation close to the plants is made that controls the amount of hand labour that has to be used in growing a crop of cotton. Where the inner points of a machine cannot be put close enough to destroy most of the weed growth around the plants, an extra charge is incurred through the necessity of employing hoe labour to perform the same. As an acre a day is average hoeing, it can be seen that such inefficiency in the cultivation is decidedly expensive. This is especially so in seasons where showery conditions exist in the early part of November, when the plants may not be tall enough to withstand very much soil being worked to them.

The first cultivation should be made soon after the row of young plants is discernible, as this creates a mulch around them and also destroys any young weed growth which may be forming. Usually this is all that is necessary until the thinning is performed, when another cultivation should be given to work back to the plants the soil which may have been removed in the thinning operations. From this point on, only sufficient cultivation to keep down weed growth and provide ample mulch to maintain moisture is required. Generally speaking, four or five more cultivations will be required after this before the last cultivation, when the crop is ''laid by'' with the riding cultivator. In each operation the soil should be worked to the plants so as to form a good mulch around them and also to smother out any weed growth which may be developing in the row. At the last cultivation the soil should be well ridged around the plants, so as to brace them against the force of any storms which might occur later in the season when the plants are heavily laden.

Cultural methods used at the Cotton Research Farm seem to indicate that it is advisable to continue the cultivation between the rows until late in the season. For this purpose a one-horse scuffler, equipped with long traces and a short spreader behind the horse, is used. Hessian is wrapped around the ends of the spreader so as to prevent catching and breaking of the branches. This cultivating assists in preventing any weed growth from developing in the ''middles'' and also maintains a moisture-retaining mulch during the period when the upper crop of bolls is developing. It is believed that this extra cultivation, especially in droughty periods, assists in the development of these bolls and enables a better class of cotton to be produced in this portion of the crop.

PLATE 120.

Illustrating the use of recommended types of cultivators—in clay soil following a rain. (Young beans in foreground.)

THINNING.

Distance between Plants.

In a country where cotton-growing is comparatively new and the seasons are variable, it is difficult to arrive at the correct manner in which to thin the cotton crop. At the beginning of this recent revival of cotton-growing in this State, there were tried many methods of spacing of the plants, heights of thinning, &c. Varying results were secured, but, by a process of experimentation and elimination, the majority of the growers seem to have arrived at the conclusion that the plants should be spaced from 18 to 24 in. apart, depending on the soil and climatic conditions.

PLATE 121.—A WELL-CULTIVATED FIELD OF YOUNG COTTON.

Many growers at first endeavoured to follow the system of leaving the plants close together, which has proved so successful in the U.S.A. cotton crops. Very poor results were obtained from such methods, both in regard to yield and the quality of the fibres produced. The explanation lies in the fact that the winter rainfall is so light that there is no possibility of having a "season in the ground" as does the American cotton-grower, who often has to delay planting preparations on account of wet soil. Usually the Queensland cotton-grower plants following the first light showers, when there is just sufficient moisture in the top soils to carry the crop to the flowering period. Unless good rains fall then a marked reduction in the yield may result and frequently the quality of the fibres will be decidedly affected. It can be seen, therefore, that the problem of the Queensland farmer is to determine methods of combating semi-droughty conditions in the early period of the plant's development and possibly severe droughty ones in the later periods. In some seasons this may be changed to heavy rainfall conditions in the later period of the plant's development.

Experiments conducted by the Department of Agriculture and Stock in conjunction with farmer co-operators and on the State Experimental Farms indicate that a spacing of 20 in. apart on the average soils gives very good yields in properly grown fields. This may be modified according to soil conditions, as it appears that, on the less fertile soils of the hilltops and upper slopes, a spacing of 18 in. apart is suitable, while the rich alluvial loamy creek soils require the plants at least 24 in. apart. There is no fixed rule in regard to this point, and each grower has to find the proper spacing for his own particular soils. It is suggested, however, that the aim should be to ascertain the distance which will give the most insurance of obtaining a profitable crop under variable conditions, rather than to hope to get in each year the highest possible yield which the soil is capable of producing.

Height of Thinning.

The proper height at which to thin the plants is very important under Queensland conditions. A large percentage of the cotton-farmers are growing this crop in conjunction with dairying, and often with a limited amount of labour. Under such conditions only a certain amount of time is available each day for the thinning of the crop. It becomes very necessary, then, for the grower to anticipate the behaviour of the plants, in order to complete the thinning operations before any material damage has been done through overcrowding.

Experiments seem to indicate that the ideal time to thin in the average crop is when the plants are 6 to 8 in. in height. A plant thinned at this height, especially when in a good strike, is less likely to develop excessive vegetative characters after thinning, and also escapes the development of any spindly growth. The longer the thinning is delayed, the more likely is the plant to become of an elongated appearance with practically no bottom crop.

It can be seen, then, under good growing conditions, that a grower may not be able to cope with the situation if he waits until the average of the plants is 6 to 8 in. in height before commencing to thin. It is suggested that in such circumstances it is better to commence operations when the plants are from 4 to 6 in. tall, as this is the easiest height at which to thin, and this will enable the speeding-up of the work. It is advisable, however, if the operations cannot be completed before the last of the unthinned portion of the field is over 12 in. in height, that extra labour be employed.

Method of Thinning.

Thinning, or "chopping" as it is often called, is best accomplished with the use of a light garden hoe. This implement allows the chopper to make quick and careful strokes, and does not cause so much strain on the forearms as does the heavy "chipping" eye-hoe which is generally used on the farm. Proper care should be taken to adjust the handle of the hoe to suit the user's height, reach, &c. The blade of the hoe should be set so as to give a cutting stroke rather than a flat scraping one, as the latter is more conducive to splitting the stalk and necessitating a second stroke. A set of the blade suitable to a short man may be entirely unsatisfactory to a tall man, &c., so that it can be seen that a decided increase in efficiency with the same amount of effort may be obtained if the use of the chopping hoe is carefully studied. The edge of the hoe should always be kept sharp by means of a flat file, and a few strokes at the end of the row help to keep the edge in good cutting order.

With a properly adjusted garden hoe an experienced "hand" can chop 3 acres a day on land that has been properly cultivated to destroy weed growth along the sides of the rows. Under the Queensland conditions it is believed that a man should do an acre in the usual time that a farmer who is dairying can spend in the cotton field in a day. This should be increased considerably where the full day is spent in the field, as the wider-spaced rows in the cotton fields in this State mean a considerable reduction in the row footage in an acre, to that which is used in the cotton fields in U.S.A. There 1½ to 2 acres a day is very ordinary chopping for such conditions as exist here.

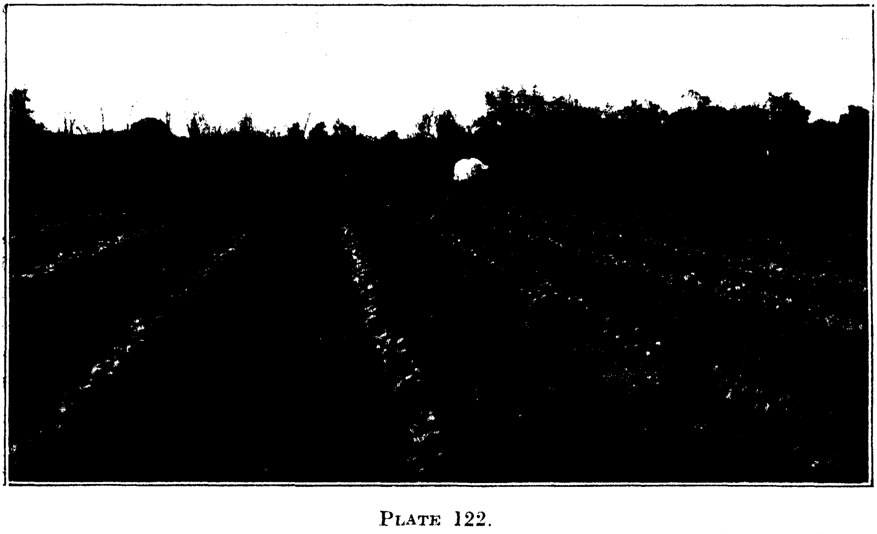


PLATE 122.
Illustrating the height of the Plants when thinned at the Callide Cotton Research Farm. These plants average about 6 inches in height.

When chopping out the cotton it is not necessary to dig deep into the ground in order to insure that the plants will not sprout again. As long as the hoe cuts below the point at which the two seed-leaves occur, there is no likelihood of any further growth. This eliminates the using of so much extra force to the stroke and also speeds up the whole operation. It also reduces the amount of loss of surface moisture which occurs where the hoe digs into the ground to such an extent as to remove all mulch between the plants.

PICKING.

In normal seasons picking usually commences during the latter part of February and continues on until the end of June, or, in the case of late-planted cotton, the end of July. In determining when to begin picking, the grower should take into consideration if the cotton is thoroughly mature, and if there are enough open bolls to allow a picker to make a satisfactory day's tally. Generally it may be taken that when there are 10 to 15 open bolls per plant these conditions exist, and picking should commence.

Given a well-grown crop of a good stand, with 10 to 15 properly open bolls per plant, an inexperienced picker should soon be able to average a daily pick of 100 lb. or more of seed cotton. In several of the districts it has been usual for the more experienced pickers to average 150 lb. and upwards, and it is anticipated that this figure will be consistently raised as the pickers become more accustomed to this operation and the growers more proficient in the production of the crop.

The Department of Agriculture lays particular stress, in the cotton-breeding operations, in endeavouring to increase the size of the boll and the suitability to rapid picking. It can be expected confidently that the rate of picking will be increased materially through the above-mentioned factors.

Methods of Picking.

The actual operation of picking is best performed by using both hands. At first this appears to be somewhat awkward, but as one becomes more experienced the increased ease of picking with both hands greatly assists in increasing the day's tally. Some pickers prefer to pick directly into a chaff-bag hung in front of them from the waist. This reduces the amount of movement necessary to get the cotton to the sack and certainly speeds up the picking. Others prefer kerosene tins, &c., especially in the taller cottons. All may suit their taste, but the point to remember is to eliminate all waste movements and thus increase the efficiency of the operations.

Care should be exercised to avoid picking leaves, trash, or diseased cotton, as these factors play an important part in determining the grade of a cotton. One frequently finds in picking a boll that part of the seed cotton sticks in the base of the open burr. It is better to leave this than go after it again. Not only is time lost in picking it out but the quality of the cotton is generally low, being of a brownish-stained tinge and often having weak and short fibres. Consequently the grade of the rest of the boll will be lowered by the inclusion of this remaining portion.

Cotton should not be picked and packed when it is wet. If showers or light rains occur the pickers may be allowed to start when the cotton is still damp, but such cotton should be spread out and thoroughly dried in the sun. Wet cotton gins badly, and is penalised by the buyers owing to the increased amount of waste.

Observations of inexperienced pickers in good crops during the past seasons have shown that the causes of their obtaining low tallies were due to the lack of observance of the abovementioned details. It is believed that, if more attention is paid to the methods of picking, the average picker will be able to increase considerably his daily tally.

FORWARDING COTTON TO THE GINNERIES.

Most of the cotton in Queensland is forwarded by rail to the ginneries, which are located at railway centres so as to serve many areas. This necessitates packing the seed cotton in suitable containers, and the ones most commonly used are wool-packs and chaff-bags. Carefully packed, from 450 to 500 lb. of well-grown seed cotton can be pressed into a wool-pack and from 70 to 80 lb. in a chaff-bag. Frequently much heavier weights are packed in each, but it would facilitate ginning if these growers would endeavour to standardise on the abovementioned amounts. Three 500-lb. wool-packs or nineteen 80-lb. chaff-bags make a nice style of bale of lint. It can be seen that, if all growers forwarded their cotton in such multiples, a much more uniform lot of bales could be ginned than where extremely varying amounts are forwarded.

In packing the containers it is desirable to include a uniform grade and staple of cotton in the one container. This assists in the grading operations, and helps to insure that the grower gets the proper price for his cotton. Uniformly packed containers also greatly assist in the ginning operations, as the packs can be more nearly matched prior to ginning, which insures a more uniform class of lint being enclosed in the one bale.

The grower should thoroughly blend the various pickers' cottons before pressing into the wool-pack, as this prevents dangers of "plates" of different grades occurring in the pack. As the prices paid for a bale of lint are based on the lowest grades contained therein, it becomes necessary to pay advances to the growers on this basis. By blending, the danger of "plates" can be obviated and a much more uniform bale delivered. Care should be taken to blend only somewhat similar grades of cotton. Where badly stained or immature cottons are produced, it is to the interest of the grower and the industry as a whole that such cottons be segregated from the higher grades of mature cotton.

Each container should be branded with the grower's initials, address, and Cotton Pool Board's registered number. This not only assists in identifying the containers as they arrive at the ginnery, but is of great help in facilitating the returning of the empty wool-packs to the proper owners. A charge of 6d. per wool-pack is deducted from the grower's initial advance to cover the cost of returning the same. Every wool-pack is subjected to sufficiently high temperatures to kill all insect life which may be in the lining; this prevents the spreading of pests such as the pink boll-worm into clean areas.

GRADING.[2]

The containers upon arrival at the ginneries are opened and sufficient cotton is examined for the grade and length of fibre or "staple" to be determined by the Government grader in charge of the operations. The cotton is then weighed by an official of the Cotton Pool Board and a representative of the Commonwealth Government and stacked in the proper place in the large seed-cotton house of the ginnery. Each grade and staple is ginned separately, and the feeder pipe to the gins is fed from the contents of three wool-packs at a time in order to secure blending. If the grower has properly blended the pack a fairly uniform grade and style of cotton is fed to the gins, but where plates of mixed grades occur in the wool-pack considerable loss of time is often encountered in endeavouring to mix the cotton at the suction spout.

Each bale of lint is sampled twice during the process of ginning in order that a representative sample may be obtained. These samples are classed by the head Government grader against standards of Queensland lint cotton which have been prepared in comparison with the World's Universal Standards for American Upland cotton. The latter standards are established each year by the United States Department of Agriculture.

The Queensland seed cotton grades are based on these standards as well, so that exceptionally uniform bales of lint as regards the grade of the cotton are the rule. As pointed out, if the growers will assist by blending the contents of each wool-pack a very high standard of uniformity of grade may be maintained.

GINNING.

The ginning of the Queensland cotton crop is performed by a commercial ginning company. This organisation, under an agreement with the State Government, undertook to erect ginneries and oil-mills sufficient to serve the industry when the present revival of the cotton-growing industry was inaugurated in 1919. Ample modern ginneries of the saw-gin type and one oil-mill have been erected. During the first season since the conclusion of the system of Government control of the industry, the Cotton Pool Board has arranged with the company to gin the entire crop.

The practice of ginning all the crop at properly located central ginneries under one authority is of the utmost importance. Such a system greatly reduces the ginning charges and materially increases the efficiency of the grading and the ginning. The experiences of all other countries where small, individual, privately owned ginneries are maintained tend to show that it is extremely difficult to maintain a high standard of ginning. Every care has been exercised during the period of Government control to develop a high standard for the finished product, and it is to be hoped that this will be maintained.

---

[2] Full information relating to the grading of the Queensland cotton crop is published in "Cotton Classing," by L. L. Gudge, Head Government Grader.—Extract from the "Queensland Agricultural Journal," June 1927.

MARKETING.

The marketing of the cotton crop is controlled by the Cotton Pool Board, a body elected by the growers to handle the cotton-growing industry. This organisation came into effect upon the expiration of the period of governmental control which took place at the end of the 1925-26 season. The cotton areas are divided into electoral districts, each of which sends one representative to the Board. The Government is represented by the Director of Marketing. The Board deals with all matters pertaining to the distribution of the planting seed, the receiving, ginning, financing, and marketing of the crop. A permanent office is maintained at Whinstanes, near Brisbane.

The Board pays all expenses of the crop from the time the consignments of seed cotton are placed on rail, with the exception of the grading, which is done by the Government. Upon the grading and weighing of the cotton at the ginneries, advances on a graduated scale according to grade and staple are forwarded to the growers; these advances approximate from 60 to 75 per cent. of the estimated value of the lint cotton. Upon the completion of the sale of the entire crop all expenses are deducted, and any surplus remaining is distributed pro rata per pound of seed cotton.

This entails a considerable delay in the grower receiving the full value of his cotton, but it is believed that such a system is the most advantageous that can be used in disposing of the Queensland cotton crop. The Pool Board sells the bulk of the lint cotton direct to the mills, which not only eliminates the charges of brokers, agents, &c., to the grower but enables the mills to obtain their requirements at the minimum expense, thereby allowing better prices to be paid to the Board.

PURE SEED SUPPLY.

The control of the pure seed supply is vested in the Department of Agriculture and Stock through legislation enacted with the approval of the Cotton Pool Board which represents the cotton-growers. This legislation empowers the department to have full control over the growing, the distribution, the fumigation, and the supervision of the ginning of all cotton seed required for planting purposes, and the testing of varieties of cotton. This authority is vested in the department in order to insure the continuity of the plan of pure seed control which was instituted when the industry was under the system of the Government-guaranteed prices, in which the Government acquired all seed cotton raised in the State.

Under the plan instituted by the department, the Cotton Belt is divided into several districts. In each district a system of developing supplies of seed is in force which aims to provide sufficient seed to meet all the requirements of that area. This supply of seed is bred up by means of a system of bulk selecting large masses of plants of a single type which is thought the most suited to the district. The seed from these is increased until sufficient to meet all the requirements. It is apparent that such a system requires a fresh supply of selected seed each season, but it is a method of preventing any marked deterioration taking place within the variety, and if properly done will enable a good class of cotton to be produced.

The system of individual progeny selections is also carried out in each district, whereby the purity of the progeny of any one plant is determined before any bulk increase of the seed is made. Under such a method a considerable length of time may be required before a pure strain of sufficient merit to warrant general distribution is obtained. It can be seen, therefore, that the bulk selection method has an important place in the seed supply system, as it provides a good commercial cotton while the plant breeder is endeavouring to develop a pure strain from a single desirable plant.

Each season certain areas in each district are designated by the departmental officers as having the best-grown cotton from which to obtain the supplies of planting seed. All seed cotton required from these areas is sent to the ginneries under proper identification marks, where it is segregated according to districts and ginned separately. The seed from this is separately treated in Simon's Heater at a temperature of 60 to 65 deg. C. for any possible pink boll-worm or other insects, and then sacked for distribution in the particular district from which it came. Germination tests are also made to ascertain if the seed is thoroughly suitable for planting purposes. The grower can see, therefore, that every effort within the present means of the department is being made to provide him with the most suitable seed of the variety of cotton thought best suited to meet his conditions.

ONE-VARIETY COTTON-GROWING.

It is believed that every effort should be made to keep Queensland on a "one-variety" basis if possible. The general trend of opinion amongst the cotton authorities of the world favours the growing of as few varieties as possible in a country and only the one variety in any particular district. The benefits obtained from such a system react not only on the grower but also on the spinner and the consumer of the manufactured article. This fact is becoming more appreciated each year, and especially in Egypt and the U.S.A. has marked progress been effected along these lines. In the State of California, U.S.A., the Association of Cotton Growers has set an excellent example for cotton-producing countries to follow. They have asked their State Legislature to pass a law making it a penal offence for anyone to grow any cotton other than the authorised variety for that district. They also have developed a system to supply pure planting seed which functions under the control of the association and the State and Federal Departments of Agriculture, so that the growers can be assured always of good seed of the best variety suited to their district being supplied to them.

A district growing only the one variety of cotton is benefited in that the purity of the planting seed can be maintained to better advantage, the problems connected with cultural practices become easier to solve, thereby increasing the general standard of production, the operations relating to picking and ginning are simplified and performed more efficiently and economically, and the average quality of the crop is more uniform and of a superior standard. These factors are all instrumental in increasing the value of the cotton crop to the grower in that the general improvement in all of the operations, due to the uniform variety, assists in reducing the cost of production, and the high quality of the lint induces buyers to pay premiums for it.

The cotton-grower can thus appreciate why the Department of Agriculture is endeavouring to breed up strains in each district which will enable all of the growers to obtain profitable returns and still keep the State on a one-variety basis. It is realised that the variety which is being grown at present may not be the most suitable although excellent results are being obtained from it. Breeding plots and variety tests of other varieties which may be suitable to Queensland conditions are being grown under the proper isolated conditions. It is anticipated that this very important problem will be solved when sufficient time has elapsed to enable the proper amount of data to be collected from these experiments.

PLATE 123.

A "bulk selected" breeding plot of the Durango variety of Queensland Upland Cotton, grown in 1926-27 at the Callide Cotton Research Station. This plot yielded at the rate of 1,708 lb. per acre of seed cotton of a staple length of a full 1⅛ inches.

THE STATE OF THE INDUSTRY.

It may be stated that the cotton-growing industry in this State is in a stage of transition between a system of assistance under governmental control and unassisted control by the growers. The system of governmental guaranteed advances during the period of 1919-26 was designed to enable the growers to learn the fundamental principles of cotton-growing. Under such an arrangement the growers were assured of such prices that they were able to experiment with the growing of the crop on all sorts of soils and at long distances from the ginneries. This enabled an excellent opinion to be formed regarding the nature of the soils and the various districts in which cotton-growing was likely to be successful.

PLATE 124.—A FIELD OF DURANGO COTTON IN THE CALLIDE VALLEY IN 1926-27.

This valley is in one of the Government Land Settlement Schemes. In 1923 this was a cattle station carrying about one beast to 10 acres of country. The photograph shows the wisdom of closer settlement. Cotton-growing has brought several thousand acres under cultivation in this and the Upper Burnett Land Schemes, and it is believed will be the means of making them into prosperous agricultural districts.

At the termination of the period of guaranteed advances, the growers requested the Commonwealth Government to grant a system of bounties on seed cotton for a term of years. It was felt that the industry had not reached a stage where it could continue without some assistance. While large numbers of the growers were producing splendid yields of cotton, the average yield per acre was still low. Many growers had developed systems of farming whereby they obtained yields of 700 lb. or better of seed cotton per acre each year. Under favourable circumstances these yields reached as much as 1,500 lb. of seed cotton of excellent quality per acre, and results as high as 2,184 lb. per acre had been recorded. It was realised, however, that there was much to learn in the finer details of growing the crop. The Commonwealth Government, realising the importance of developing the industry, accordingly granted a bounty of 1½d. per lb. on the better grades of seed cotton, and ¾d. on the lower grades, for a period of five years, starting with the season of 1926-27.

In conjunction with this bounty it was decided to develop a cotton-spinning industry in Australia. It was realised that the best markets for Australian-grown cotton would be in this country. As Australia annually imports some £15,000,000 sterling worth of cotton goods, it was believed that an industry could be developed which would eventually rank of great importance. This, then, would afford the outlet for large quantities of Australian-grown cotton. Accordingly a graduated bounty varying from ½d. to 1s. per lb. of yarn manufactured in this country, providing it is composed of one-half Australian-grown cotton, was granted in conjunction with the bounty on seed cotton.

The growers, have, therefore, this period of five years in which to refine their methods of growing cotton. The State Department of Agriculture is assisting in determining the proper methods by annually conducting large numbers of experiments with grower co-operators and on the Cotton Research Farm. Every effort should be made by all farmers in the cotton areas to grow as much cotton as they can properly handle. With a cotton-spinning industry practically assured in this country, an excellent future for cotton-growing awaits the farmers in those portions of this State where cotton can be grown successfully. The point to remember is that sufficient cotton should be produced to meet a considerable proportion of the spinning mills' requirements if the full value of the opportunity is to be realised.

[To be continued.]

BRUSH SLEDGE.

The accompanying illustration shows a boat or sledge for carting prunings and other rubbish to the fire heap. The description is as follows:—Take two strips of woven-wire fencing about 4 feet wide and 25 feet long. The length depends upon the size of the load to be hauled. Lay the strips side by side and fasten them securely at certain intervals to prevent the brush from slipping between. Fasten each end and the centre securely to the two-by-fours. They should be on the upper side of the wire, so that the boat will glide smoothly over the ground, and take the entire strain. Attach the swingletrees to the two-by-fours at the front end of the boat with a heavy twisted wire or chain. The boat is then finished and ready for service. Hitch the team to the boat, and drive between the rows of trees where the brush is to be picked up. The brush is thrown on from both sides and tramped frequently. When the boat is loaded drive outside the orchard to an open space, and dump the load. This is done by making a sharp turn and driving the team back alongside the boat, thereby unloading the brush and rolling it into a bundle for burning. The boat, of course, must then be turned right side up to keep the two-by-fours off the ground.—"Australasian."

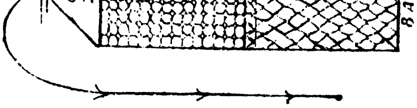


PLATE 125.—SCIENCE SERVES THE FARMER.
Display by the Division of Entomology and Vegetable Pathology at the recent Gympie Show.

AN AUTOMATIC GATE.

Travellers in horse-drawn vehicles who have ever regarded the opening and closing of gates as somewhat of a nuisance, now find when travelling alone by car that the inconvenience has increased owing to the impossibility of leading the car through the gateway as was done with the horse. Various contrivances have been adopted to obviate the necessity of alighting from a car when passing through a gateway, the most popular at present being a grid much similar to that in use at railway crossings.

The inventive genius of Mr. Jack Jones of Britannia Station in the Charters Towers District has evolved a gate that can be economically constructed, is as stock proof as any gate can be, and will open and close automatically to allow of the passage of a car or other motor-driven vehicle.

Referring to the plan, it will be observed that the weight of the car on the "run-ups" or ramps depresses them, causing the drum of the lifting gear, to the axle of which they are attached, to revolve, thereby lifting the gate to a height of 8 ft., and maintaining it at that height until the car has passed through and off the ramps on the other side.

In the original gates at "Britannia," old buggy wheels were used with sapling cross pieces to make the drum, while the other timbers necessary were cut in the bush close handy. The simplicity and efficiency of this kind of gate has impressed all who have seen it, and caused them to influence Mr. Jones to have an application made for patent rights.

In the near future, doubtless, a more or less elaborate structure will be on the market, but it is probable that those to whom such a gate makes an appeal will be able to construct gates themselves by the payment of a small royalty.—N. A. R. POLLOCK, Northern Instructor in Agriculture.

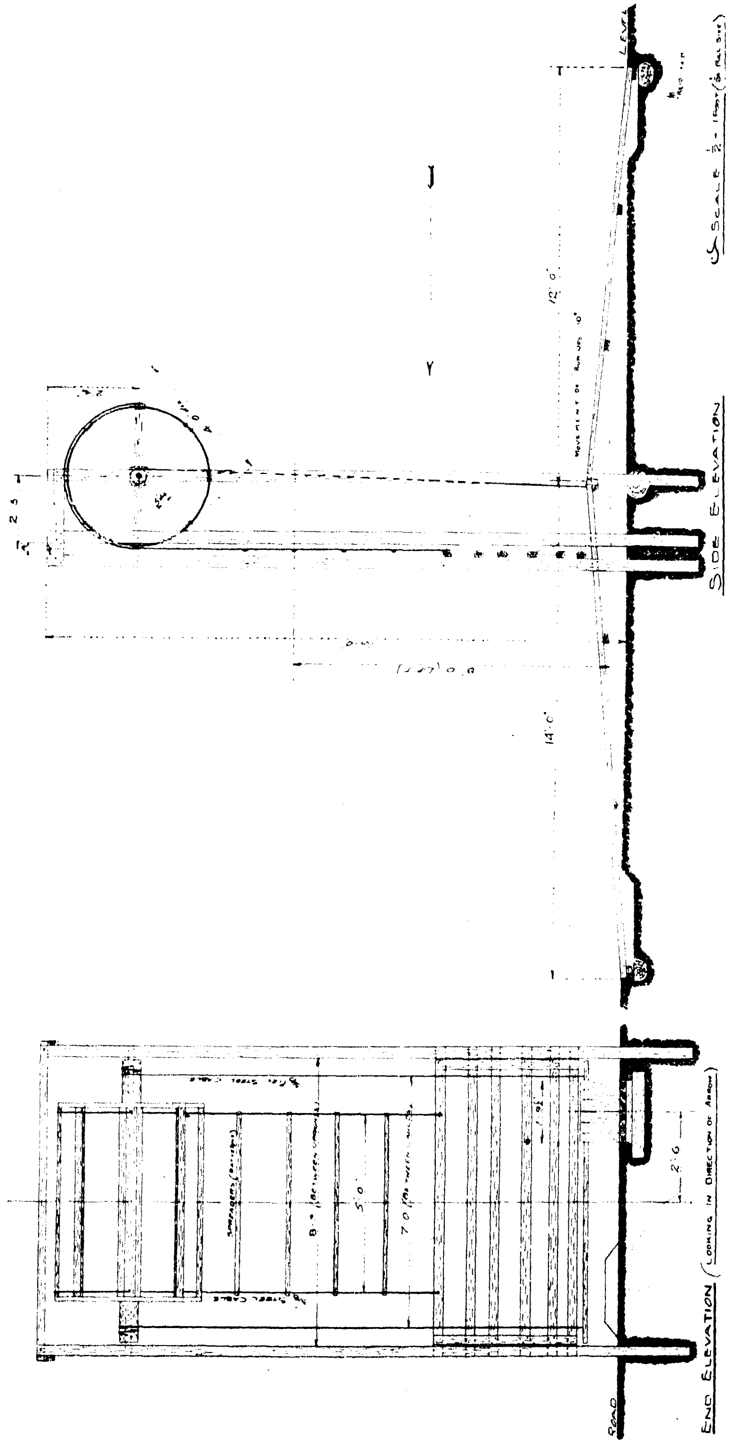


PLATE 126.—AN AUTOMATIC GATE.

PLATE 127.—MANDARINS FROM THE MORETON RED LANDS.

This remarkably fine cluster of Scarlet Mandarins, numbering 10 dozen in all, attracted much attention recently in the Roma Street Markets. For a second crop such a spray is very unusual. The quality also was good. The length of the cluster was 5 ft. It came from the orchard of Mr. James Collins, Redland Bay.

Buy

RELIABLE TYPEWRITERS

from a

RELIABLE FIRM.

We are Sole Agents for—

L. C. SMITH silent ball-bearing Typewriters
CORONA - - Portable Typewriters
GESTETNER - All British Duplicators
DALTON - - Adding Machines
MARCHANT - Calculating Machines

WE also have a large stock of second-hand Typewriters of all makes, thoroughly [illegible] guaranteed, and at prices from £5 to £20. Terms from £1 deposit and £1 monthly can be arranged to suit clients. Everything we sell is fully guaranteed. Write for particulars.

ESTABLISHED 1903

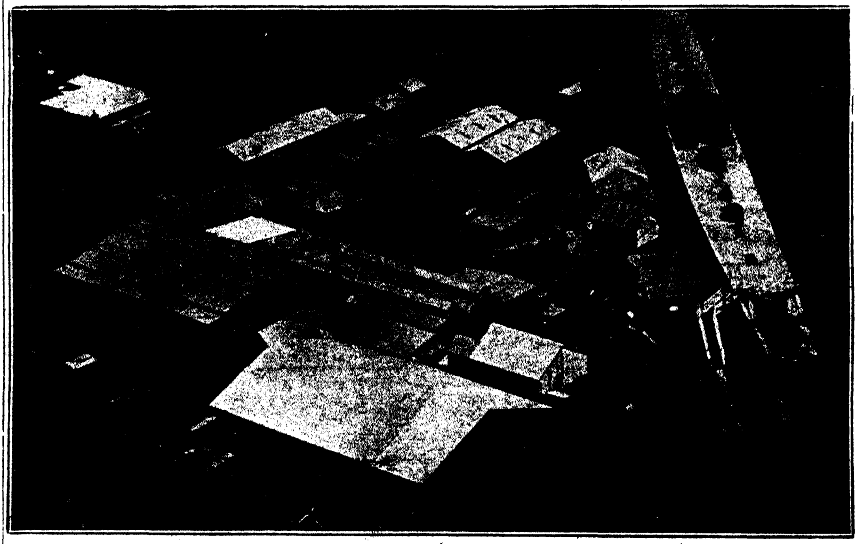
MACDOUGALLS LTD.

(formerly Australian Typewriter Supplies Co.)

363-365 Queen Street

Box 345 **BRISBANE** *'Phone: 717-718*

McKenzie & Holland
(Australia) Pty. Ltd.
Electrical and Mechanical Engineers
Northgate - - - - Brisbane



Manufacturers of Complete Layouts and Junctions for Railways and Tramways, Dog Spikes, Rivets, Bolts, Nuts, etc.

Steel, Iron, and Brass Castings, Electric Welding, etc.

We Specialise in the Manufacture of
Bridge Ironwork, including Pile Shoes, Rings, Fishplates, Bolts, Washers, Deck Spikes, etc.

Quotations for your Requirements Promptly Submitted.

Telephones:
M 1131 and M 1132.

Telegraphic Address:
McKenzie Holland
Nundah, Queensland.

THE FARMER AND HIS MARKET.

By A. M. MICHENER, Service Department of the National Bank of Commerce, New York.*

Present hardships and discontent among farmers are not wholly the result of the war. In part they reach back to maladjustments evident before that conflict dislocated customary relationships and increased the economic strain. To a considerable extent they have their roots in a lagging adjustment of agriculture to improving technique in transportation and production. This lag was aggravated but not caused by the war. Nor is it peculiar to agriculture. Industry has been faced with similar developments; but because of inherent differences in its nature the problems of agriculture have been different and its response to conditions has been slower.

While in point of time development of transportation facilities has brought the farmer closer to his market, geographically it has carried him farther and farther from it. Even for perishables the significance of time and distance has been greatly reduced by refrigeration. These very factors which have enabled the farmer to reach more distant markets have made possible the expansion of those markets through concentration of industrial population, this in turn encouraging the use of more and more remote areas for agricultural production. The result has been to attenuate if not to destroy the farmer's contract with the consumer.

Not only was the field of competition extended by the opening up of new regions to commercial agriculture, but its force was intensified by improved technique of production, which tended to outrun increasing demand. To relieve this situation, the farmer is compelled more and more to turn his attention to distribution, seeking to cheapen the process, shorten the route, economically if not physically, and renew his contract with the consumer.

An essential step toward these ends is standardisation of products. In the common language of standardised grades is found the meeting ground with marketing agencies and consumers of which he has been deprived by geographic remoteness. Moreover, in standardised grades is found a meeting ground with other agricultural producers, affording the fundamental basis for competition. Through this medium the essential factors of a market can be brought together on a scale commensurate in extent with that of production and consumption without assembling those factors physically. The market can be brought to the farmer when he can no longer carry his produce to it.

While this step in distribution is being brought upon the farmer by the same economic forces that have induced manufacturers to establish a nationally advertised brands and trade marks and to put up package goods which are carried sealed from factory to consumer, the farmer's response has been somewhat different. In manufacturing industries these distributive devices have been made possible by concentration of management and by production in large scale units. Because of the nature of one of its raw materials, land, agriculture must remain relatively decentralised in operation.

Despite this fact there is some evidence of a tendency toward concentration of ownership and control in agriculture which may afford it a basis similar to that developed by industry. Alternative tendencies also are present, however. Many of the advantages of large scale organisation for studying the technique of production are already available to farmers through the service of Federal and State Departments of Agriculture and agricultural colleges and experiment stations. The growing use of this service by individual farmers is attested by improving methods and increasing efficiency in production. Benefits of grading and large scale marketing operations are secured in some instances by co-operative organisations among farmers. There remains for others, however, the need for control of quality and maintenance of standards such as are provided for manufacturers by large scale organisation.

A good beginning has been made in meeting this need through governmental agencies as research in production has been cared for. The position of such agencies, as disinterested parties has been a great advantage in carrying forward the work and, in the case of the Federal Government, also the nation-wide scope of its activities. But a large field still awaits the initiative of the farmer in solving his problems of distribution.

The value of reliable standards for agricultural products was recognised long ago, even as it became manifest in industrial progress. But the difficulties were greater and the pressure toward it gathered less rapidly. In some agricultural lines the exigencies of the situation had brought action, either on private initiative or through governmental agencies, even before the outbreak of the war. In the necessities of the war and in the depression following it the need was keenly felt, and rapid progress in standardising grades has since been made both by governmental agencies and by producers' organisations.

---

*In the "Commerce Monthly" for August.

With a background of long study of the problem, the United States Department of Agriculture was in a particularly favourable situation to take immediate steps. Uniform and recognisable standards for farm products had been part of the Department's pre-war programme to improve the position of the farmer in marketing his produce. Moreover, they were a necessary adjunct to other parts of that programme—the market news service and the establishment of accredited warehouses whose receipts, as collateral, would aid the farmer in securing better terms for credit. The Department is responsible in large measure for the wide spread of the movement toward standardised grades and for the rapid advance that has been made in recent years.

Grades Now in Use.

Standards covering at least certain characteristics are now in use, officially or tentatively, for such commodities as cotton, wool, and tobacco, for the main commercial dairy products, grain, broom corn, hay, soy beans, the principal fruits and vegetables, and the more important kinds of live stock and meats. Tentative grades have been prepared for honey, and work is progressing on standards for oil content of cotton seed.

These grades are by no means all on the same basis of authority, nor have they reached the same degree of acceptance and use. But already they have brought improvement in the ease of marketing and distribution. They are particularly serviceable in the trade, requests for them frequently originating there. Retail sales are still largely on the basis of direct and unaided inspection by the purchaser. At the other end of the line, the farmer still has in many cases rather limited direct access to Government inspection and grading. But even through indirect contact they have demonstrated in striking fashion their value to him, thus paving the way for further progress.

The official grades so far worked out do not attempt to cover all points of quality in the product dealt with, but rather to set up standards for those characteristics which may be readily determined on a commercial basis. For example, potatoes are classed in their grades according to similar varietal characteristics, size, freedom from freezing injury, soft rot, damage caused by dirt or other foreign matter, sunburn, second growth, growth cracks, hollow heart, cuts, scab, blight, dry rot, disease, insects, or mechanical or other means. To allow for slight variations a certain tolerance is permitted from these specifications.

While these grades give no assurance beyond varietal similarity as to the internal quality of the potatoes, they do give definite standards for measuring the external characteristics and condition of a shipment. The standards are readily applied and are objective, so that individual judgment and bias play a minimum part in their application. The grading of a lot is based upon sampling, and here care must be exercised to secure a representative sample. Not all commodities lend themselves to purely objective standards. Butter and cheese require the use of taste and smell; but, as far as possible, official grades are designed to eliminate the personal factor. Even descriptive terms are carefully defined.

In working out standards the usual method of procedure is for agents of the Department of Agriculture to prepare tentative grades based on the usage of the trade throughout the country. Efforts are then made through hearings and otherwise to ascertain the reaction of interested parties—producers, traders, consumers—to these grades, and finally to arrive at a system of grades that will be acceptable to all interests. Mostly they are used experimentally for a period by the Department and even in commercial transactions. When what appear to be satisfactory grades have been arrived at, they are promulgated as official United States grades, although still further amendment can be and often is made.

For some commodities official grades have been made mandatory under specified conditions, but in most cases they are permissive—that is, the service of inspection and grading is available to interested parties upon the payment of a small fee. Where States have regulatory laws, United States standards are frequently adopted as the official State grades, and are even made mandatory as far as the authority of the State extends. It was reported in the fall of 1926 that altogether thirty States had officially adopted one or more of the United States standards for fruits and vegetables.

The two important cash crops, cotton and wheat, have been provided for by special laws, which afford the legal basis for United States standards and which make those standards mandatory under prescribed circumstances. The remaining official standards have been established under three general enabling Acts—the Warehouse Act, the Food Production Act passed during the war, and its successor in annual Appropriation Acts providing for the continuance of the inspection service begun under it.

Standards for Grain.

Following upon the establishment of cotton grades, the Grain Standards Act was passed in 1916, making the use of official standards when they had been promulgated mandatory for all transactions in interstate and foreign commerce except those by sample. Under this Act grades were established for shelled corn in 1916, for wheat in 1917, for oats in 1919, for rye in 1923, and since that time for grain sorghums, feed oats, mixed feed oats and barley. Standards for milled rice and rough rice have been recommended and are used as a basis for trading, but have not been made official and are not under Government inspection.

Wheat grades are based upon such measurable physical characteristics as test weight per bushel, moisture content, proportion of damaged kernels, foreign material other than dockage, and wheats of other classes. Grade specifications for other grains are of the same general type. Methods of making the tests are prescribed and numerous devices have been worked out to aid in their speed and reliability.

The official grain grades have gained wide acceptance and are generally used for all kinds of commercial transactions except mill buying of wheat for grinding, where characteristics other than those included in the official grades are frequently considered. Like the cotton standards, United States grades for grain, especially wheat, have received recognition abroad, and are rather generally accepted as a basis for purchasing from this country. To a greater extent than in the case of cotton grain grades are carried directly back to the farmer.

The Warehouse Act, passed in 1916, is the basis of another series of grades, which are mandatory for the purposes of the Act. Originally the provisions of the law applied only to cotton, grain, wool, and tobacco, but in 1923 it was amended to give the Secretary for Agriculture authority to place under it such other products as he might consider properly storable. Since that time a number of other products have been added to the list.

Receipts issued for goods stored in warehouses licensed under the Act are required to designate in some manner the grade of the goods and to employ for this purpose official United States grades when such have been promulgated. For commodities not already provided with official grades the Secretary is authorised to set up standards, or to designate what grades or requirements shall be followed.

Cotton and grain standards were, of course, already provided for when the Act came into force. There had long been a desire for wool standards, manifest even as early as the fall of 1914 in a request from the National Wool Growers' Association. In 1923 standards covering diameter of wool fibre were promulgated under the Act and also became effective for permissive use outside warehouse transactions. At the suggestion of manufacturers' associations, which had endorsed those standards, consultations were held with British users and in 1926 a uniform set of wool standards was agreed upon and the former United States grades were revised accordingly. Corresponding standards for wool tops were also agreed upon, uniform for the two countries, and were promulgated in 1926. Thus for wool, an important import commodity in the United States, the official grades in this country are in conformity with those in Great Britain, the chief world market.

Tobacco Grades.

Tobacco grades also have been established under the authority of the Warehouse Act. To provide for the great variation in characteristics of tobacco the American-grown leaf is divided first into six classes—flue-cured, fire-cured, air-cured, cigar filler, cigar binder, and cigar wrapper. Within these classes types are distinguished, twenty-nine in all, for twenty of which tentative grades have been prepared, representing approximately 97 per cent. of American production. These grades are based upon quality, colour, and length of leaf, with definite standards established for each.

While not yet officially promulgated for general use, these grades have been employed successfully for more than four years in the administration of the Warehouse Act, and have been used by co-operative associations as a basis for settlement with their members. They have served for the grading of more than a billion pounds of tobacco, and already they are having a marked influence upon farmers.

Grading Under Inspection Service.

The remaining grades prepared by the Department of Agriculture are permissive. Many are still tentative and a number yet in the experimental stage. Developed in connection with the inspection service, these standards find their legal basis in the annual appropriation Acts enabling the Secretary for Agriculture to ''investigate and certify to shippers and other interested parties the class, quality, and/or condition of cotton, fruits, vegetables, poultry, butter, hay and other perishable farm products when offered for interstate shipment or when received at such important central markets as the secretary may designate, or at points conveniently reached therefrom.''

The field of perishables is one where the services of the department have been particularly helpful, since there has been little progress in co-operative sales organisation among growers of highly perishable short-season truck crops for shipment to distant markets. Dairy products, including eggs, have been somewhat better cared for through producer activity, but even here there is a wide field of usefulness open to official grades. Among live stock producers numerous co-operative marketing agencies have been formed, but these do not appear to have made any special attempt to establish producers' grades.

Live Stock.

The live stock market is abundantly illustrative both of the problems encountered in attempting to prepare a set of grades and of the conditions it is sought to remedy. The value of the live stock depends largely upon the quality of meat. In preparing an experimental set of live stock grades, it has been necessary to arrive at some determination of external characteristics which appear to give the closest indication of the quality of the dressed meat. The basic division into classes, such as steers, heifers, lambs, and so forth, and into age and weight groups is relatively easy, and these factors are important determinants of meat quality. Beyond these divisions the grades proposed are based upon three types of characteristics—conformation, finish, and muscle quality so far as it can be determined in the live animal. Difficulties of grading are further enhanced by the fact that within the basic classes and groups grades depend upon the application of descriptive terms. Moreover, each animal must be graded individually.

Proportionate to the difficulty of grading live stock is the need of the producer for some kind of uniform market standards. Because of these very difficulties of grading, trade practices have remained in a particularly unorganised state. Live animals have always been bought on inspection at the central markets and descriptive terms are subject to variations between markets and even in the same market between different times of year or different seasons. With improving rail facilities and market reports, producers are less inclined than formerly to confine their shipments to a single market, and a basis for accurate comparison of quotations in various markets is, therefore, especially desirable. Moreover, producers of live stock, particularly cattle and lambs, are frequently long distances from their markets, making the presence at the market of a disinterested grading authority especially serviceable.

Carcass meats are somewhat easier to grade since they are practically the final product. But they, too, are gauged mainly by the application of descriptive terms, and again each carcass must be graded. Standard grades have been prepared for the principal kinds of meat, but have not yet been made official under the inspection authority except in the case of carcass beef. Substantially these same grades for all meats have been used since 1917, however, by the Department of Agriculture in its market news service, and they have been the basis of grading millions of pounds of meat purchased by Federal and State authorities. Within the last few months an experiment has been begun in stamping beef carcasses with official grade marks for identification in retail cuts, in order to test consumer demand for the assurance furnished by these standards.

Butter and Cheese.

Butter and cheese are far more easily graded than live stock. They are already in the state to be consumed, sampling is an adequate basis for grading and in addition to flavour and aroma certain measurable objective characteristics such as moisture content and physical condition are involved.

Eggs.

Tentative grades issued for eggs depend upon standards for individual egg quality, which are based on the condition of the shell, position and size of the air cell and condition of the yolk, white and germ. On this same basis, plus average weight, buying grades have been established for easy application by the local buyers who secure eggs direct from producers. Another set of grades has been devised for use in wholesale trading, based on the number of eggs of each grade, according to the individual standards, found per case and upon a series of minimum average weights and upon varying degrees of uniformity. Still a third set of grades, on the same principle as the wholesale grades, but with subdivisions within the grades, has been provided for use in retail and jobbing channels.

While United States egg grades are still far from finding country-wide use, the buying grades are already employed in a number of localities, and wholesale standards are applied as a basis of inspection in certain markets. Use of retail grades so far is confied largely to contract purchases by Government agencies and public institutions.

Fruit and Vegetables.

Grades for these products have to do mainly with varietal uniformity and with objective characteristics and conditions, such as size, colour, firmness, freedom from blemish, decay, injury, foreign material, and so forth. The work of establishing standards in this field has been extended rapidly since 1922, when their usefulness was enhanced by a widening of the scope of Government inspection. Some of the most helpful activities and striking results have been achieved in this field.

While individually fruits and vegetables do not hold a place in the agriculture of the country at all comparable with that of such commodities as cotton, grain, live stock, and dairy products in the aggregate, they play an important part in total returns to the farmers of the country. Government grades and inspection have proved especially helpful to the farmer in handling these products because markets for them were generally more localised than for the major commodities and were frequently without much co-ordination or standardisation. Moreover, fruits and vegetables are in the main finished products when they leave the farm, passing through trade channels and into the hands of the consumer without processing of any sort. For them, therefore, standard grading is particularly effective in bringing producer and consumer into closer contact.

The Government inspection service is not only the basis for establishing standard grades for most of the commodities provided for, but it has been a very important factor in giving them utility and in popularising them. Inspection at central markets was begun by the Government as an aid to the Food Administration during the war, and was designed to cut down the waste and uncertainty prevalent in the marketing of perishables, and to reduce the economic and financial loss involved in marketing disputes. So well did it fulfil its purpose that demand for this service continued after the Food Administration closed, and after that it was provided for in the annual appropriation Acts.

Finally, in 1922, the scope of the service was broadened to include inspection at shipping points. The utility of this last step is attested by the demand for the service, a demand which the Department has so far been unable to meet fully. In 1926 a total of 165,529 cars was inspected at shipping points, one-fourth more than in the preceding year and a marked increase over the 73,000 cars inspected during the fiscal year 1923, the first year of operation. Inspections at receiving points in 1926 were only 32,531 cars, less than a single year's increase in shipping-point inspections and but a small advance over the preceding year. The whole inspection service is practically self-supporting. While an appropriation is made for it annually, fees charged to cover the cost of the service are returned to the Treasury.

Inspection at Shipping Points Emphasises Value of Grades and Standards.

The shipping-point inspection service has probably done more than any other single activity of the Department of Agriculture to bring directly home to the farmer the meaning and value of standard grades. It gives him, in the first place, an immediate measure of the value of his products. It shows him the shortcomings of his output and affords the basis of a sound programme of producing for the requirements of the market. It provides the basis for financial return in proportion to the quality of the products and their utility to the market. Value of uniformity and pack is emphasised.

By shipping-point inspection the economic waste involved in shipping ungraded and low-grade products is brought home to the farmer. When he sees his wheat relieved of carrying the freight charge on weed seeds, his marketable apples of paying the freight on culls, his good eggs of paying the freight on bad ones, the question of grading at the farm becomes of more than academic interest to him. It is estimated, for example, that over 13,890 extra freight cars were required to haul the dockage shipped from the four spring wheat States after the 1923 crop was harvested, and more than 800,000 dollars was paid for its transportation. Farmers who cleaned their wheat at the farm gained something over 5 cents per bushel in financial return.

The value of a Government inspection certificate in protecting the farmer from claims for damage incurred in transit needs no demonstration. The still further gain of relieving purchasers all along the line from the necessity of cutting down their prices to allow for uncertain quality is not so directly evident to him, but he is likely sooner or later to profit by it.

It is through the application of official grades at the shipping point that the most striking changes in methods of distribution have been brought about. Thousands of cars of fruits and vegetables are now sold f.o.b. loading point, making it easy to direct their marketing and delivery after they are on the rails, to reduce cross-hauls and avoid central-market gluts. A tendency toward decline in relative number of consignment sales is noticeable, on the other hand.

Another interesting development is the organisation of so-called f.o.b. auction companies, which deal exclusively on the basis of Government grading at the shipping point. These companies have representatives in numerous markets and conduct simultaneous auctions over leased wires. Goods are listed and bids received entirely on the basis of Government certificates. Business can be handled very expeditiously and sales are often made while the actual produce is still hundreds of miles away. The shipment can then be directed by the shortest route to its destination without necessarily passing through a central market, yet as far as the transaction is concerned it has had the benefit of an even wider market than could be found at a single receiving point.

These developments illustrate the strides that have been made through the Government's shipping-point inspection and grading service in renewing the contact of the farmer with the market. Through this service official grades, country-wide in their applicability, are carried to the farm. Through the flexibility it allows in trading and handling it makes possible the broadening of the market to a scale that can bring to the widespread production and consumption of to-day a utility comparable with that of local markets to local constituents.

Despite the very great value to the farmer of Government inspection service and of the uniform standards established for many of his products, they have obvious and unavoidable shortcomings which leave a whole field open for the farmer's own efforts. The standards and the inspection are of necessity confined largely to external characteristics. The farther they get from such measurable bases the more difficult it is to eliminate individual judgment in their application and to maintain their uniformity. They leave practically untouched the question of inherent quality of value in use.

For inherent quality the producer alone is responsible, and he alone can maintain it, in so far as it can be maintained in the face of varying weather and other conditions. In this fact lies the basis of similarity of his marketing problems with those of industrial producers, and in this fact also his opportunity for positive, maximal standards, if they are to be established, and for aggressive merchandising. As yet the possibilities in this field have scarcely been envisaged, but more and more the vital character of the problems involved is being brought home to the producer in his struggle to maintain operations at profitable capacity.

Except where concentration of ownership has occurred, the usual resort of farmers in order to provide for merchandising on a scale commensurate with the market to be reached has been organisation for co-operative marketing. Grading of produce is a natural step in the effort of such organisations to market against competition from individuaul producers, and much has been done among their memberships to raise standards of quality. Rather than to develop their own grades, however, the tendency is for co-operative marketing associations to adopt United States standards, where such standards have been established, because of the wide recognition accorded them in the trade. This is done sometimes even when distinctive brands are also used. Not only has this practice aided the producers' associations in developing their marketing operations, but their use of the official standards has helped to widen acceptance of these standards among trade agencies.

There are, on the other hand, some outstanding instances where co-operative associations have established their own grades as well as brands, and by means of extensive advertising have secured for them recognition not only in this country but abroad. Notable among them are organisations for marketing California citrus fruits, raisins and prunes, and apples from the Pacific North-west. In all these cases advertising has been carried directly to the consumer, as in the case of so many manufactured products. The citrus fruits are stamped with the brand of the organisation, and prunes and raisins not being perishable are put up in retail packages for sale unbroken to the consumer. A similar experiment is being tried in distributing branded eggs but without the same type of advertising.

These developments are significant from the point of view of distributive technique, and they have done much to improve the quality of the products, but as yet grading even by such associations is largely on the basis of external characteristics similar to those found in Government standards. Whether greater refinements in standards of quality are possible for many farm products and can be secured by growers' organisations, and whether the market will support them if they can is still to be seen.

Even along the line of present attainments the movement toward standardising grades of agricultural products, whether issuing in governmental activity or producer control, is bound to have a great influence upon future developments in the agriculture of the country. That a more effective mechanism of distribution in line with the possibilities of modern transportation and communication will help to relieve the present difficulties of the farmer there can be little doubt.

LIVE STOCK IN QUEENSLAND.

The Registrar-General, Mr. George Porter, has kindly supplied the following statement showing the number of Live Stock in the several Pastoral Districts and in the State on the 1st January, 1927, together with similar details for last year:—

District.	Number of Horses.		Number of Cattle.		Number of Sheep.		Number of Pigs.	
	1926.	1927.	1926.	1927.	1926.	1927.	1925.	1927.
Burke ..	53,690	42,738	825,822	685,267	2,928,780	1,978,074	516	414
Burnett ..	39,283	38,185	467,036	440,562	5,263	7,487	32,933	30,808
Cook ..	49,072	44,252	527,624	520,708	270	12,580	7,673	8,323
Darling Downs	72,569	69,158	468,389	414,433	1,862,217	2,045,745	42,180	35,664
Gregory North	24,711	19,119	297,335	212,735	1,964,021	1,086,545	36	35
Gregory South	10,215	10,429	176,275	135,915	286,189	344,859	1	1
Leichhardt	48,058	40,384	761,676	568,449	979,070	840,487	1,915	1,513
Maranoa ..	29,254	28,607	273,224	235,658	2,785,128	3,366,810	1,553	1,485
Mitchell ..	41,258	33,318	196,115	114,015	6,696,458	4,135,681	498	460
Moreton ..	65,461	62,730	502,658	476,828	25,257	22,022	75,731	69,895
North Kennedy	70,456	62,899	503,296	454,412	4,528	22,214	5,673	5,160
Port Curtis	39,093	33,486	449,203	383,711	27,462	28,040	8,523	7,877
South Kennedy	37,985	33,879	432,297	328,545	154,642	165,182	1,281	1,709
Warrego ..	24,255	21,684	236,587	191,168	2,938,281	2,799,535	600	510
Wide Bay..	33,012	30,754	319,108	302,439	5,757	5,511	20,485	19,808

	Horses.	Cattle.	Sheep.	Pigs.
Total for year 1926 ..	571,622	5,464,845	16,860,772	183,662
Total for year 1925 ..	638,372	6,436,645	20,663,323	199,598
Decrease	66,750	971,800	3,802,551	15,936

FARM TRACTORS AND THEIR MANAGEMENT.

By E. T. BROWN.*

Recently I was an interested listener to a discussion between two farmers. One was running his farm as a motorised farm and the other relied upon horses for his power. I am not going to recount the discussion in full, but a summary of the statements of both parties may prove instructive. Let the last-mentioned farmer speak first. He claimed that horses were preferable for the following reasons:—When horses are employed less artificial manure has to be purchased and these manures are expensive; a tractor depreciates in value from the time it is bought, but a horse grows into money; ploughing by tractor cannot be done more cheaply than by horse power; more labour may be required for horse work, but skilled labour—at a high price—must be used for tractor work; horses work practically every day of the year, but tractors do not; if a horse falls sick it can be replaced, but if a tractor goes wrong the whole work of the farm is delayed; the work of looking after a tractor is greater than the daily attention needed by horses; for light work or ploughing on hilly land horses give better results; and, lastly, it is bad policy for a farmer to sink too much money in machinery.

The Tractor Owner Speaks.

The owner of the motorised farm was most emphatic, and he stated that his arguments were unanswerable. They were as follows:—The tractor saves the farmer time, worry, and money—Time, since the tractor accomplishes the work more expeditiously; it saves him worry, since his work is not controlled to the same extent by the weather; it saves him money in all directions. The tractor allows a farmer to overtake an excess of work at the rush season of the year when it is extremely difficult to obtain additional labour; the quality of the work done is better, especially as regards ploughing; less man power is required on the motorised farm, since one man with a tractor can raise three or four times as much in the way of crops as a man with a team; a tractor releases a large amount of food that can then be used for feeding to stock with a view to meat production. It releases about five acres of cultivated land for every horse that it replaces.

The Non-Tirable Tractor.

A tractor will work for very long hours so long as it is supplied with the necessary fuel, oil, and water. It does not grow tired, and, moreover, there is no need to rest it during the day; it can be employed most efficiently for all kinds of belt work, whether the stationary machines to be driven are large or small; road haulage can be performed more quickly and much more cheaply with a tractor than with horses, since the power of a tractor is sufficient to haul a heavy load at a decent speed over average roads; a tractor costs nothing for upkeep when it is not being used, whereas horses have to be fed whether they are working or not; a tractor does not require feeding, grooming, nor does the stable have to be cleaned out daily; and, lastly, the cost of working a tractor is less than when horses are employed.

Wagon Hitches.

Ordinary farm wagons can be employed as trailers for the tractor to draw, but it is essential that the hitches used should be suitable for the purpose. A considerable portion of the power generated by the engine can be wasted if the hitch be improperly set. As a general rule, it is found that the ordinary farm wagon is too high, when the shafts have been removed, to hitch directly on to the draw-bar of the tractor. If the connection be made direct, when this difference in height exists, two results follow: The front of the wagon is pulled downwards—the wagon is always higher than the tractor—and the rear of the tractor may be eased off the ground. This will add very considerably to the weight of the trailer and its load, and it will reduce the adhesion of the rear wheels of the tractor, thus causing great loss of power. The solution of the difficulty is, of course, to bring the level of the two draw-bars equal. Place the connection on the wagon as low as possible, and by means of a suitably made and designed bracket, supported by stays, attached to the draw-bar of the tractor, the two can be brought into line. The bracket must be made specially for the individual tractor, since there is no universal design which will answer in all cases. When running on the road never exceed four to five miles an hour, and do not forget that the outfit must be licensed and an annual tax paid.

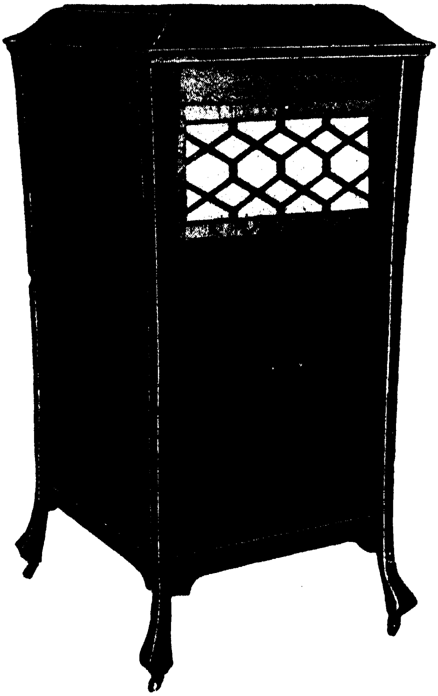
---

* In the "Farmer and Settler."

King & King, Ltd.

Music Warehouse, Queen Street

BRISBANE



Our unique 60-guinea Cabinet Model.

In our previous advertisements we illustrated our wonderful value 16-guinea and 20-guinea

Symphonas

We wish now to bring under your notice one of our De Luxe Models. Our High-Class Symphonas are "A thing of beauty and a joy for ever." They are built to satisfy the most exacting taste, and being

SYMPHONAS

the tone quality is supreme.

We are agents for—

The Famous Columbia Portable at 6 guineas, Decca Portable Phonograph, Columbia and Regal Records.

In Pianos and Player Pianos—

We offer the Highest Grade at reasonable prices. Our Agencies include—

THE BRINSMEAD
CABLE
GULBRANSEN
AUTO-HARMONIE

and other renowned makes.

We can satisfy all your musical wants

Write us for full particulars

VIMLICK **The Super Quality Medicated Stock Lick**

The Manager, Dimora Station, Maxwelton, writes us as follows:—"We sent 10,000 Sheep to the Charters Towers District on agistment. There was plenty of feed but they were not doing as well as I would wish. Being impressed with the prospects of Vimlick, I ordered a ton for these sheep. The result exceeded my expectations. Within three days the difference was noticeable. Within a week they were doing well. Within three weeks one would not recognise them as being the same sheep. The result was truly marvellous and the cause was undoubtedly **VIMLICK.**"

Wholesale Distributing Agents—

SAMUEL ALLEN & SONS, LTD.

BRISBANE, TOWNSVILLE, and CAIRNS

Thos. Brown & Sons, Ltd., Rockhampton
Corser & Company, Limited, Maryborough
Messrs. Campbell & Amos, Ltd., Bundaberg

A STANDARD IN CONCENTRATED PLANT FOOD

A.C.F. FERTILISERS

FOR ALL CROPS

A.C.F. Fertilisers set a standard in concentrated plant food. Feed them to your crops and watch the result! An inquiry costs nothing—write now for information and prices.

AUSTRALIAN CO-OP. FERTILISERS LTD.,
LITTLE ROMA STREET, BRISBANE.

Insure with the

Royal Insurance Coy., Ltd.

FUNDS EXCEED £35,790,927.

FIRE DEPARTMENT.

Fire Risks of all kinds accepted. Loss or damage by Lightning, Gas Explosion, and Bush Fires included. Loss of Profits also accepted.

ACCIDENT DEPARTMENT.

Personal Accident and Sickness, Public Risk, Plate Glass, Burglary and Fidelity Guarantee Insurances accepted at lowest current rates.

Be wise to-day and take out a Royal "Paragon" Accident and Sickness Policy (covering 32 sicknesses).

MARINE COVERS GRANTED.

Queensland Branch
Royal Insurance Buildings,
355-357 Queen St., Brisbane.

GEO. L. EVES, Manager for Queensland.

If Disinfectant has to be used, USE THE BEST—a few good ones to select from

CN very strong, 25% Cresols.
Sidolia contains 10% Cresols.
Bestyette contains 12% and 2% Cresols.
Cidol for the Cockroaches.
Solution "D" for the Bed Bugs and their eggs.

We are sole agents for the above and will be delighted to supply you with any further information. Just write us. All above guaranteed by us.

NORRIS AGENCIES LTD., 639 Ann St., Valley

THE LATE JAMES A. ROBERTSON.

AN APPRECIATION.

The cattle and pig breeding industries of Australia, and especially of New South Wales, have suffered a severe loss by the death of Mr. James A. Robertson, M.R.C.V.S., Herd Master to the Department of Agriculture, New South Wales, which occurred suddenly at his home at Lindfield on the North Shore line, Sydney, on Monday, 26th September.

Mr. Robertson attended the Melbourne Show on departmental and Herd-book business, spending an exceptionally busy week, returning to Sydney apparently in normal health on the Friday before his death. On Sunday he had a seizure, from which he never rallied.

As a cattle breeder Mr. Robertson had attained a foremost position in Australia. He had a sound and deep knowledge of the various breeds and of the principles of breeding, and this he applied with the intuition of the master breeder. When he entered the service of the New South Wales Department of Agriculture, thirteen years ago, the State dairy herds were at a low ebb, but by careful selection and judicious but not lavish introduction of new blood they have been developed to a high plane on both standard and production lines.

Mr. Robertson paid a great deal of attention also to the pig studs at the several Government institutions, and his influence for good in suggesting and carrying through improvements in these studs resulted in a very considerable improvement in type and quality of the animals bred and exhibited.

Mr. Robertson was born in 1884, and his early training was acquired on the Coolangatta Estate, on the far-famed South Coast of New South Wales. At the age of twelve years he was conducting milk and cream tests for the Jersey Milk Condensory on the estate. He spent some time also at Logan's Aston Estate, in the Bombala-Delegate districts of New South Wales, and later started out on his own in the dairying business. He went to Edinburgh in 1905, and four years later graduated with honours as a veterinary surgeon at the Royal Veterinary College, and was offered a post on the college staff. This, however, he did not accept, but returned to Australia and began practice as a veterinary surgeon at Lismore, New South Wales, and four years later entered upon the official position as herd master, which he has since occupied. Also for twelve years he held the position of Examiner in Animal Husbandry and Meat Inspection at the Technical College, Sydney, and in dairy farming and live stock at the Hawkesbury Agricultural College, Richmond.

Part of Mr. Robertson's early apprenticeship was served under Messrs. John Pottie and Sons, well-known veterinary surgeons of Sydney.

His place will be a difficult one to fill both in departmental and private life. He had a large circle of friends, all of whom will join in extending sincere sympathy to his bereaved widow and family.

WHEAT CROP PROSPECTS.

On his return from a recent tour of duty the Director of Agriculture, Mr. H. C. Quodling, informed the Press that, owing to the extent of country embraced in the competition, it will entail a good deal of travelling before it is finalised; since leaving Brisbane during the first week of this month over 1,000 miles have been traversed, and this has permitted of a useful survey of much of this year's wheat crop. Leaving the Maranoa district out of the question, where, unfortunately, an aggregate of only a few thousand bags will be harvested this year; also the Inglewood district, in which late-maturing crops will be the only ones to show any pronounced response to the recent rains, as the earlier-sown fields made an attenuated growth, one cannot be otherwise than impressed with the extraordinary improvement wrought by the October rains, and manifest in the wheatfields over practically the whole Darling Downs. If nothing untoward happens (and wheat is never safe until it is sound and dry in the bag) this year's yield should reach the three million-bushel mark. In some districts it is doubtful whether more promising crops have even been grown, and this applies more particularly to those on the deep, rich black and brown soils common to the Downs. The better-grown and heavier-yielding crops are invariably to be found where a system of summer fallowing has been observed. In January, the rainfall on the Darling Downs ranged generally from 8 to 11 inches, and in the first four months of the year the aggregate fall varied between 15 and 21 inches. Where the surface of the soil had been cultivated immediately after last year's harvest and brought into a fit condition to absorb moisture, and the surface subsequently kept in a state of cultivation, reserve supplies of moisture were in this way retained in the subsoil. Luckily, good rains fell in June—about three inches—

and, although July, August, and September were dry enough to cause much anxiety to growers, the October rains saved the situation, and a bountiful harvest is in prospect. "The wheatgrower has certainly had his share of disappointment," said Mr. Quodling, "but there's no question to my mind of his succeeding where early and systematic cultivation is practised. The deep soils of the Downs, particularly on the plains, do not require deep cultivation; as a matter of fact, for wheat, 3 to 4 inches are all-sufficient; but for success, the principles underlying cultivation require to be carefully observed. Better and more suitable varieties are now available to growers, and officers in the Agricultural Branch of the Department of Agriculture and Stock have accomplished very much in this direction."

"Those who are in a position to rapidly cultivate extensive areas of land by means of tractors and large horse teams, and so save the moisture before it is disseminated, will undoubtedly do much towards the improvement of Queensland as a wheat-growing State; which, in addition to sheep-raising in the agricultural districts, is also suitable for a number of other forms of primary production not generally open to settlers in other States."

Progress of Wheatgrowing.

When asked for an opinion whether wheatgrowing was showing material progress in any locality, Mr. Quodling stated that in a number of localities a distinct advance was to be observed in the area being cropped with wheat; possibly the more pronounced improvement was to be seen on the black soil plain country south-west from Evanslea, on the Cecil Plains line. There are a number of large wheatgrowers in the district, many of whom are successfully combining wheat and sheep. Their crops this year are extraordinarily promising, and yields of from 8 to 10 bags per acre will prevail. The largest individual area cropped in this locality is 2,000 acres by Messrs. Zeisemer Bros., who have very fine crops, included in which is a 640-acre paddock of Gluyas wheat, also extensive areas of other varieties. The land cropped is a fair sample of several hundred thousand acres of similar land, much of which could, and will, no doubt, be turned to similar account in the future.

WHEAT CROP COMPETITION.

SEASONAL PROSPECTS.

Wet weather interfered with the work of judging crops entered in the wheat crop competition promoted by the combined Agricultural Societies of Queensland.

The controlling Divisional Societies originally comprised the Eastern Downs H. and A. Association, Warwick; the Royal Agricultural Society of Queensland, at Toowoomba; and the Roma and Wallumbilla Agricultural Societies, certain boundaries being fixed for the purpose of the competition, for three districts known as:—

(1) Southern and East Central;
(2) North Central;
(3) Western.

No. 1 embraces the railway system of Wallangarra, Killarney, Maryvale, Goomburra, King's Creek, and Dirranbandi;

No. 2, King's Creek, Milmerran, Cecil Plains, Tara, Chinchilla, Jandowae, Bell, Cooyar, Haden, Crow's Nest, and Toowoomba; and

No. 3, Chinchilla, Cunnamulla, Injune, Juandah.

Owing to the severity of the season in the Maranoa and contiguous districts, no entries were received from growers in those areas which came under the purview of the Roma and Wallumbilla Societies; however, the other two Agricultural Societies at Toowoomba and Warwick have taken an active part in promoting the competition. Substantial prizes are being offered, and the Royal National Association of Brisbane has supplemented these by a Grand Championship Cup and other trophies.

Ten of the twenty odd crops entered through the Royal Agricultural Society of Toowoomba have already been judged.

The judging is carried out under a fixed scale of points—

(1) Apparent yield	1 point for every bushel
(2) Trueness to type and purity	20 points.
(3) Freedom from disease	30 points.
(4) Evenness of crop	10 points.
(5) Cleanliness	20 points.

The date for the receipt of entries was extended by the Eastern Downs H. and A. Association, to 29th October.

SELF-FEEDERS FOR PIGS.

ONE AND TWO WAY SELF-FEEDERS.

F. BOSTOCK, Assistant Instructor in Pig Raising.

A "self-feeder" is simply a device by means of which a supply of grain or other feeds may be kept constantly available to the pigs, in order that they may satisfy the cravings of their appetites.

Pigs in the wild state were naturally self-fed animals, living upon such foods as would satisfy their appetites. The marked success of the self-feeding system of pig raising in America is largely due to the fact that the pigs may eat an abundance of such feeds as will nourish them to the best advantage.

Pig raising as an industry is generally regarded as a profitable one, particularly when it is carried on in conjunction with some other branch of agriculture, such as dairying and mixed farming.

It is intended, in this article, to indicate how, by the introduction of the self-feeder as a labour-saving appliance, the actual amount of labour necessary for carrying on the business might be reduced.

Self-feeders, as illustrated in Figs. 1 and 2, are practicable when grain is being fed, and for this purpose are intended for use more especially during the growing and fattening stages in the life of the bacon pigs, and are not specially recommended for use in feeding breeding sows, though even for this purpose the self-feeder may be used, but if so used the mixture of foods should be more nitrogenous (flesh forming) than is usually given to baconers. This is because breeding sows in general only require a limited allowance of grain.

The two types of self-feeders as shown in the plans (Figs. 1 and 2) should be built on skids or runners to prevent pigs rooting at the floors and to facilitate moving. If strongly constructed this method of transport will be found to be much easier and quicker than loading the feeder into a wagon or on to a sledge.

Self-feeders should be designed primarily to keep an available supply of grain constantly before the pigs, and at the same time protect its contents against waste, due to wind and rain.

It consists of a hopper to hold the food and a trough below into which the grain is allowed to flow, the sliding and hinged flaps regulate the amount of grain permitted to flow into the trough as the pigs eat it.

The hopper is made sufficiently large to hold several days' supply of feed, and the inside walls should be as smooth as possible in order not to prevent the flow of grain into the trough.

When it is desired to feed two or more foods separately in the same self-feeder, a partition may easily be placed in the hopper at any distance from either end.

The self-feeder should be placed on a wooden or concrete platform if possible (Fig. 3), and if well constructed with first-grade timber, and given a coat of paint about once every twelve months, should give service for quite a number of years.

By means of the self-feeder the average farmer should obtain as good results as the hand-feeder with much saving of time and labour.

According to American experiments, there is very little doubt which method is the more economical, and as shown by the results of a number of experiments the self-feeder system is advantageous in every respect. Its use results in larger daily gains in live weight, bringing the pigs to marketable weights at an earlier date, and although the feed is consumed more rapidly there is an actual saving in the amount of feed required to produce the 100 lb. of gain. This is a fact of extreme importance and is well worth consideration.

Last, but not least, one of the advantages to be gained is the saving of time and labour. At the same time, the farmer must not neglect the self-feeder; because he has filled the hopper with grain he cannot afford to forget about it. The old adage, "The eye of the master fattens his cattle," holds good when applied to the self-feeding of pigs. There are a number of things which may happen to the self-feeder if left without attention. For instance, the feed may block in the hopper, thus leaving the pigs with a dead self-feeder, or the feed may become soiled in the trough, making it unpalatable to the pigs.

In cases where a mixture of feeds is being used the farmer should furnish the proper proportions of the different feed constituents. He should feed a larger percentage of protein (flesh-forming) to the young pigs which are growing than to the older ones. Just because pigs are self-fed a mixture of feeds does not mean that they are receiving a balanced ration.

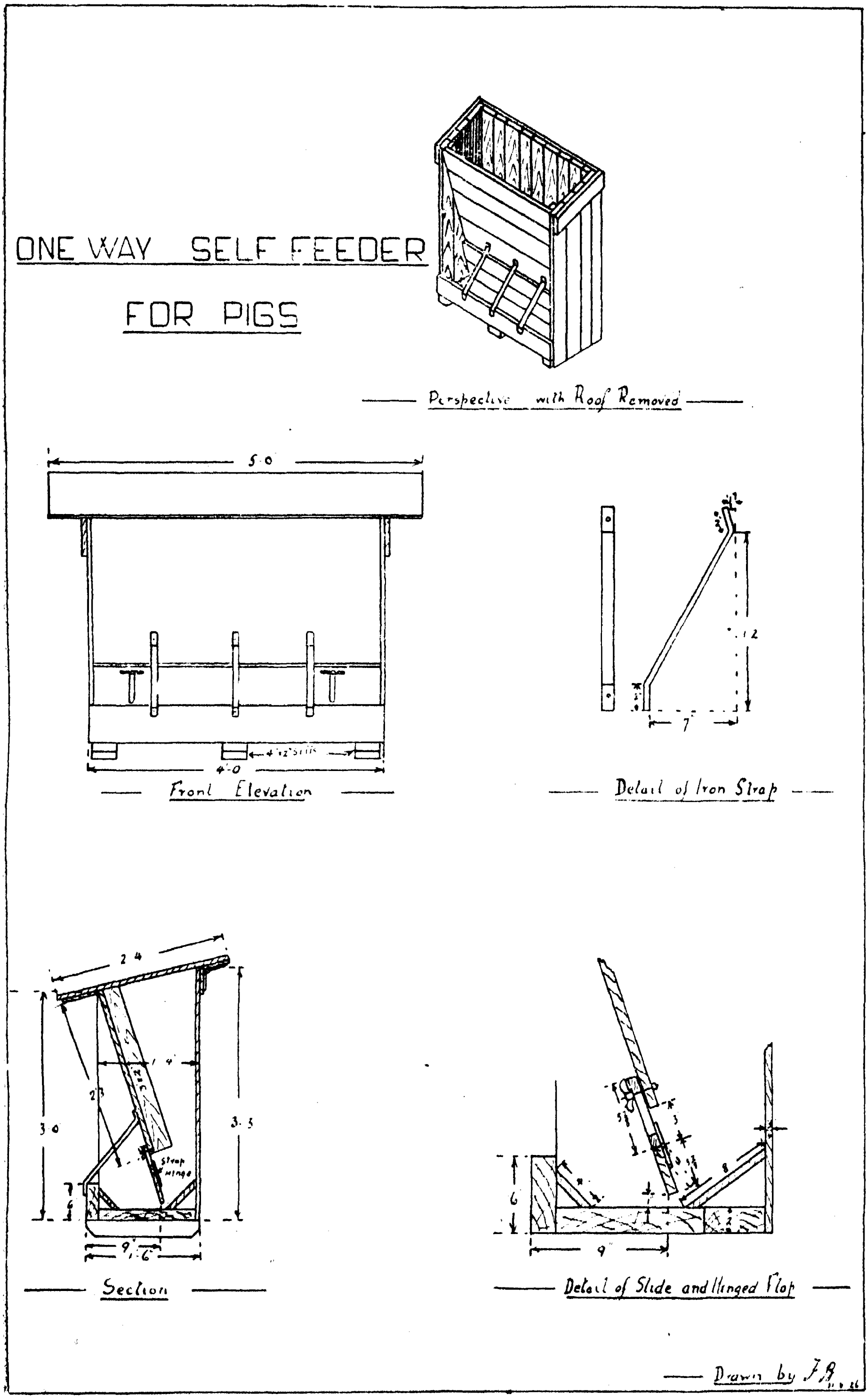


PLATE 128 (Fig. 1).

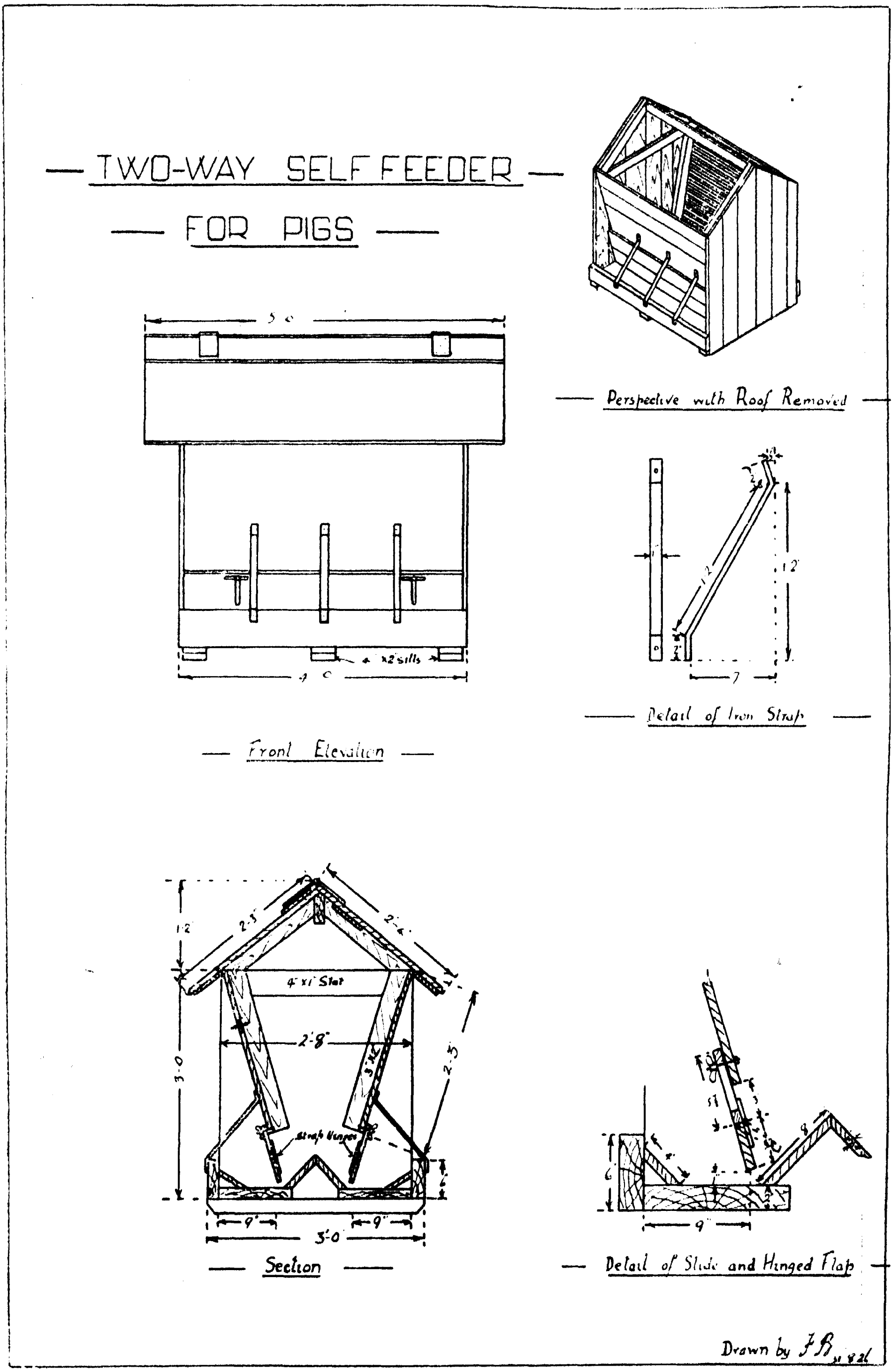


PLATE 129 (Fig. 2).

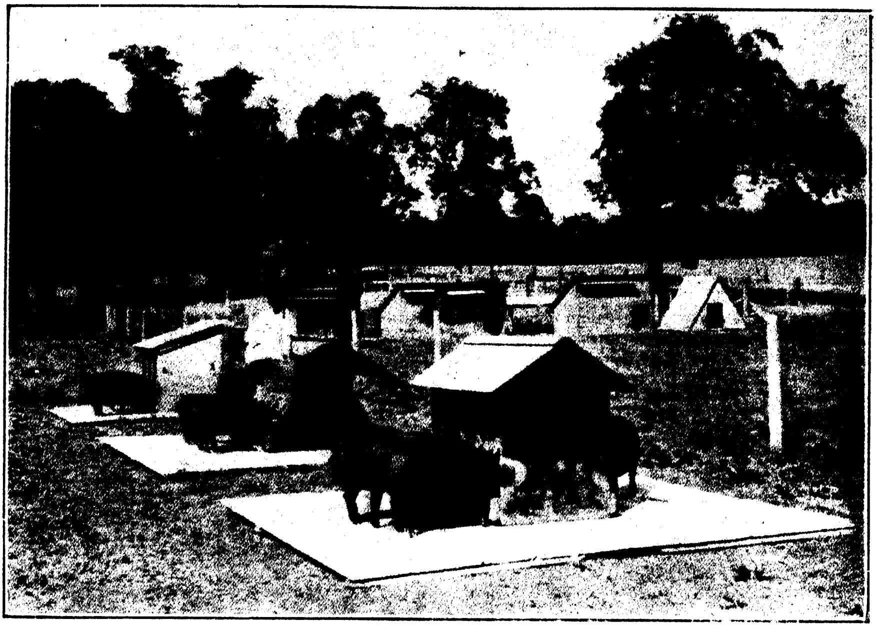


PLATE 130 (Fig. 3).—SELF-FEEDERS IN USE ON AN AMERICAN FARM.

Note the Wooden Platform on which the Feeders are placed.

PLATE 131 (Fig. 4).—SELF-FEEDING SYSTEM IN OPERATION ON A LARGE AMERICAN PIG FARM.

A self-feeder is by no means a substitute for a knowledge of feeding. The self-feeder may be adapted to the feeding of any kind of grain, although shelled grain and ground foods are most commonly used. It may be used to feed maize on the cob, but in this case the feeder would be required to be of a larger size than shown in Figs 1 and 2 in order to hold sufficient grain to feed a number of pigs for several days without refilling.

Maizemeal or barley would require a smaller opening to prevent too rapid a flow of grain than would, say, whole maize. It will be noted in the plans that the sliding and hinged flaps have been fitted with thumb screws so as it may be adjusted to suit the type of grain being fed.

Farmers feeding with dairy by-products will have no need to feed concentrates such as protein meal or meat meal, for skim milk is very suitable to balance such grains as maize or barley. Of course, the dairy by-products should not be self-fed, for they would soon spoil if more feed is fed than the pigs will clean up at one feeding. Self-feed the grain and hand feed twice daily enough of the skim milk to balance the ration.

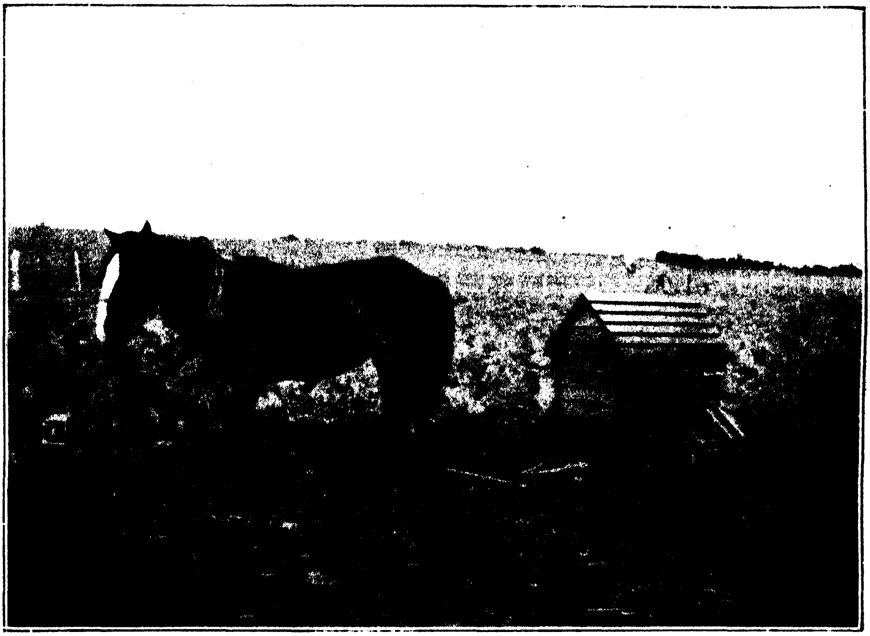


Plate 132 (Fig. 5).—Showing Method of Transportation.

According to results of American experiments when feeding pigs without pasture, the following was found to be the average proportions in which to feed milk and grain, and should serve as a guide:—

For pigs just after weaning 4 lb. to 6 lb. of skim milk to each 1 lb. of maize will be found to be sufficient to make the maximum gains. As the pigs grow older the proportion of skim milk may be decreased. Pigs weighing 50 lb. to 100 lb., 3 lb. of skim milk to every 1 lb. of maize, and pigs at 100 lb. to 150 lb. would require from 2 lb. to 2½ lb. of skim milk to every 1 lb. of maize consumed. Pigs on pasture such as lucerne, rape, barley, &c., would need only about half as much skim milk as indicated above. Considerably more milk than previously stated may be fed with good results when a surplus is on hand. Pigs cannot be expected to do much grazing on a crop that is any distance away from the self-feeders. It is in such cases where grazing is intended to form part of the ration that the skids or runners will be found to be an advantage in taking the self-feeder to the crop it is proposed to graze off.

Copies of the plans illustrated in this article may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane, Queensland.

ONE-WAY SELF-FEEDER FOR PIGS.—MATERIAL REQUIRED.

Members.	Number.	Length.	Size.	Material.
Skids	Three	1 ft. 6 in.	4 in. x 2 in.	Hardwood
Trough	One	4 ft.	6 in. x 2 in.	Pine
Trough	One	3 ft. 10½ in.	12 in. x 2 in.	Pine
Trough	One	3 ft. 10½ in.	4 in x 2 in.	Pine
Trough	One	3 ft. 10½ in.	8 in. x ¾ in.	Pine
Trough	One	3 ft. 10½ in.	4 in. x ¾ in.	Pine
Front Panels	Five	3 ft. 10½ in.	6 in. x ¾ in., T. & G.	Pine
Front Panels	Two	2 ft. 3 in.	3 in. x 2 in.	Pine
Sliding and Hinged Flaps	Two	3 ft. 10½ in.	4 in. x ¾ in.	Pine
Ends and Back	Twenty-four	3 ft. 3 in.	6 in. x ¾ in., T. & G.	Pine
Ends and Back	One	7 ft.	6 in. x ¾ in.	Pine
Top	Ten	2 ft. 4 in.	6 in. x ¾ in., T. & G.	Pine
Top	Two	5 ft.	6 in. x ¾ in.	Pine

Hardware.

Three 1-inch by ¼-inch iron straps.
Six 3-inch strap hinges.
Two 3-inch by ½-inch bolts with thumb nuts.
Nails, &c.

TWO-WAY SELF-FEEDER FOR PIGS.—MATERIAL REQUIRED.

Members.	Number.	Length.	Size.	Material.
Skids	Three	3 ft.	4 in. x 2 in.	Hardwood
Trough	Two	4 ft.	6 in. x 2 in.	Pine
Trough	Two	3 ft. 10½ in.	12 in x 2 in.	Pine
Trough	Two	3 ft. 10½ in.	8 in. x ¾ in.	Pine
Trough	Two	3 ft. 10½ in.	4 in. x ¾ in.	Pine
Panels	Ten	3 ft. 10½ in.	6 in. x ¾ in., T. & G.	Pine
Panels	Four	2 ft. 3 in.	3 in. x 2 in.	Pine
Sliding and Hinged Flap	Four	3 ft. 10½ in.	4 in. x ¾ in.	Pine
Ends	Twelve	4 ft. 2 in.	6 in. x ¾ in., T. & G.	Pine
Frame of Roof	One	4 ft.	6 in. x 2 in.	Pine
Frame of Roof	Four	1 ft 9 in.	3 in. x 2 in.	Pine
Frame of Roof	Two	2 ft.	4 in. x 1 in.	Pine
Roof	Twenty	2 ft. 4 in.	6 in. x ¾ in., T. & G.	Pine
Roof	Four	5 ft.	6 in. x ¾ in.	Pine

Hardware.

Six 1-inch by ¼-inch iron straps.
Eight 3-inch strap hinges.
Two 5-inch strap hinges.
Four 3-inch by ½-inch bolts with thumb nuts.
Nails, &c.

THE JOURNAL IN HOLLAND.

Thus the Director of the Ver Bureau Voor Handelsinrichtingen (Foreign Relations Office), Amsterdam: " . . . In view of the many inquiries which reach us for information about Australia . . . . we shall appreciate having your monthly (the 'Queensland Agricultural Journal') in our library. . . . ."

PARALYSIS OF THE HINDQUARTERS IN PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

In the course of recent tours both in the Northern and Central Divisions as well as in Southern Queensland, and also during a lengthy experience in New South Wales, Mr. Shelton has noticed a number of pigs suffering from the trouble most frequently spoken of as Paralysis of the Hindquarters. This disease is also, on occasion, erroneously referred to as Staggers and Rickets, while other terms used to indicate a similar condition are Down in the Back, Kidney Worms, or Paralysis.

As it is evident from a perusal of the many references to the actual cause of this somewhat unfortunate occurrence in pigs that it is largely a "deficiency" disease, one almost entirely due to an insufficient supply of mineral matters (bone-forming materials) in the food and to lack of green food, &c., it is obviously a subject that must be handled more along the lines of prevention than actual treatment; one coming within the ambit of the "instructor" more than the "inspector," and one that must be remedied more by an all-round improvement in the system of breeding, feeding, and handling than by the administration of medicine. Mr. Shelton's notes on the subject are therefore of unusual interest.—Ed.

Numerous inquiries reach the Department annually as to the cause and treatment of this all too common and very peculiar disease, if such it might be called. The subject has been dealt with previously in this Journal as well as in pamphlet form, but as both leaflet and pamphlet are now out of print, and as the trouble is of such an important nature, it warrants revision and repetition—this especially as further evidence of a very helpful nature has lately been received through official channels and from correspondents overseas.

A great deal has been written regarding "Paralysis of the Hindquarters in Pigs" and much research work has been carried out, principally with a view to ascertaining the exact nature of the conditions under which the disease occurs, and in studying the subject it is of interest to know just what other authorities are doing, and to determine whether or not their findings are applicable to our conditions in Queensland.

The disease is very largely one due to a deficiency of mineral matters in the food and to malnutrition, hence the writer's objective is to suggest how by improved methods of feeding and caring for pigs these abnormal conditions can be overcome. The Veterinary Officers of this Department should be consulted on all matters relating to medicinal treatment; their advice is also always available in case of any outbreak of disease no matter whether it be of a minor or of a more serious nature.

Paralysis of the hindquarters in pigs is, unfortunately, a trouble not confined to young pigs only, nor is it localised in Queensland. It appears to be a source of considerable trouble wherever pigs are kept the world over, though where the conditions under which pigs are kept are favourable to early maturity and to the healthy and rapid growth of all breeding stock, the disease has been kept in check and has caused but little trouble.

In referring to the occurrence of paralysis in pigs in this State and elsewhere, the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S., states that—

"The subject of paralysis in pigs has been given considerable attention for many years past.

"A small leaflet was issued some years ago to farmers dealing with what was then considered three principal causes of the complaint, but in recent years it has been ascertained that the paralysis, in many cases, is due to the lack of a vitamine known as Fat Soluble A, which is essential to the growth of animals, a deficiency leading to rickets.

"This vitamine is found in certain herbage, milk, cream, butter, eggs (yolk), beef fat, and cod liver oil. Latterly cod liver oil has been recommended to make up for the vitamine referred to, with, as far as can be ascertained, marked benefit.

"There is little to report regarding the incidence of the disease, as it occurs in any part of Queensland where pigs are improperly fed and not given the necessary attention. The same conditions exist all over the civilised world. It is mostly young growing pigs which are affected, and generally those in good condition.

"Apart from the paralysis, the pigs usually feed well and appear normal, the pathological changes taking place being apparently microscopical."

Professor L. A. Maynard, of the New York State College of Agriculture, Department of Animal Husbandry, has written on the following lines as a result of his experience:—

"This problem has been under investigation here for several years. On the basis of our studies, we believe the trouble is the result of improper mineral nutrition which prohibits a normal development of bone. This is due to a lack of calcium in most of our rations. We have shown that where paralysis occurs, the long bones are very deficient in calcium and phosphorus, and marked histological changes have occurred. These changes have been observed on a diet low in calcium. However, a lack of calcium is not the only factor involved, because the question of assimilation also comes in.

"Certain feeds are rich in the factor aiding mineral assimilation, and certain others are not. A ration which contains a certain amount of chopped alfalfa (green lucerne or lucerne chaff) is very useful for preventing paralysis, because it supplies the needed calcium and phosphorous and the factor aiding assimilation as well. We have shown, however, that there is a very beneficial effect from the adding of ground limestone and bone meal to rations which are now causing the trouble."

In a communication from Professor R. Adams-Dutcher, Head of the Department of Chemical Agriculture at the State College and Experiment Station, Pennslyvania, U.S.A., the following remarks appear:—

"I have the feeling from the knowledge that I have been able to obtain by reading, and in experimenting, that the diet is a very important factor in preventing paralysis in pigs, and probably calcium and phosphorus accompanied by proper vitamine-carrying foods are the most important dietary factors. Any number of animals have been relieved of the paralytic symptoms by feeding bone meals or other mineral mixtures carrying calcium and phosphorous; mixtures which carry calcium carbonate have also been effective. Veterinarians in New York have had fairly good success with wood ashes, but it is my recommendation that lime or bone meal be made available in those districts where hog paralysis is causing trouble. If lucerne or some other leafy green stuff or hay is available, this would also improve the situation, helping the animals to utilise this mineral matter to the best degree of efficiency."

The following extracts have been taken at random from mimeographs supplied by Professor John M. Evvard, as a result of extensive experiment along the lines of feeding mineral mixtures, both simple and complex, to pigs not only with the idea of preventing paralysis, but of stimulating growth and enhancing the returns.

Comment.

(1) The feeding of minerals in whatever form allowed was quite advantageous in that the average daily gains were substantially increased, the length of the feeding period economically shortened, the feed required per 100 lb. gain considerably reduced, and the profits per pig enhanced.

(2) In feeding experiments the appetites of pigs for minerals is shown to be of considerable reliability, inasmuch as they clearly excelled check groups receiving no minerals.

(3) Although there appears to be some advantage gained from the feeding of a mineral mixture carrying more than the single emphasised ingredients, such as common salt, calcium carbonate, bone ingredients, and potassium iodide, yet just how far one can afford to go in the adding of other ingredients in practice is a matter for individual estimation and determination. Our experience has certainly indicated that some of the main ingredients necessary in the mineral mixtures are those that carry sodium and chlorine (common salt), calcium (lime, limestone, and bone materials), phosphorous (bone materials, rock, and other phosphates), and iodine (potassium or sodium iodide). The further addition of suitable combinations of such ingredients as common sulphur, a little charcoal, some Glauber's salts, as well as some other ingredients in small percentages or quantities has, on the whole, shown some benefits in our experimental work.

(4) It appears as if the farmer in his feeding of sulphur, charcoal, and other often-questioned materials has not gone entirely wrong, and like his well-founded belief in yellow corn (as against white corn), we should be sure of our grounds before declaring them or any of them non-beneficial.

(5) Our other work with minerals has shown the dollar and cents practicability of adding a good mixture of mineral ingredients to many ordinary pig rations.

(6) Our general recommendation is to provide a suitable mineral mixture for all classes and grades of pigs—the growing pigs, the breeding sow, the suckling pigs, the boars and all—and it is our suggestion that the mineral mixture be self-fed in an easily accessible place, well protected, and under shelter if possible.

(7) A good mineral mixture may be made up for practical everyday feeding as follows:—

> Common salt, 20 per cent.; finely ground raw bone meal, or steamed bone meal, or spent bone black, or rock phosphate, or acid phosphate, 40 per cent.; finely ground high calcium limestone, or wood ashes, or finely ground oyster shell, or lime thoroughly air slacked, 40 per cent. Total, 100 per cent.

If sulphur is desired, add approximately 10 lb. to the 100 lb. To every 100 lb. of the above minerals, add from ½ to 1 oz. of potassium iodide, mixing all ingredients thoroughly.

The following remarks upon this disease form the conclusions arrived at by Dr. J. W. Connaway, a prominent American Veterinarian, who has been associated with many of the experiments relating to this particular trouble:—

Paralysis of the hindquarters in pigs may result from one of several causes, and the treatment will vary to some extent, according to the cause of the paralysis. The causes are—(1) Injuries; (2) impaction of the lower bowels; (3) kidney worms; (4) heavy suckling; and (5) lumbago or rheumatism. Each of these causes and the preventive and curative measures are discussed in order as follows:—

Paralysis from Injuries.

If the pig has been running in the same yard with horses, mules, or cattle, it may have been kicked, pawed, horned, or trodden upon, and sustained an injury to the spine, legs, or muscles of the back or hips.

Treatment.—Make a thorough examination of these parts. Sometimes an injury is deep-steated and can be detected only by firm pressure and other manipulations of the paralysed parts which produce evidence of pain, fractures of bones, or rupture of tendons and muscular tissues; or the pressure of deep-seated abscesses. If the paralysis is due to an injury, the best treatment is absolute rest. Put the patient under shelter in a comfortable pen, where it can be bedded and kept quiet. Feed a light laxative diet and keep the pen and bedding clean. After a time, a stimulating liniment rubbed over the injured parts may hasten recovery. A mixture of equal parts of turpentine, ammonia, and cotton-seed oil makes a very good liniment. An abscess should be opened and be given proper antiseptic treatment.

Paralysis from Impaction of the Bowels.

Paralysis of the hindquarters may result from an impaction of the lower bowels with hard masses of dung, causing excessive pressure upon the nerves and blood vessels in the pelvis or hip region. If the paralysed pig seems to be badly constipated, use rectal injections of warm water to soften and remove the hard lumps of dung. Add a couple of tablespoonsful of Glauber's salts to slops (food) and fed twice daily until the bowels are loose. Impaction is most frequently due to improper feeding, and to lack of tone of the bowels. A properly balanced ration with an adequate supply of water will prevent impaction of the bowels. In cold weather, pigs frequently do not have a proper supply of water. If the water is icy cold, pigs do not drink a sufficient quantity and are liable to become constipated. Some provision should be made for warming the water to take off the chill. A warm slop once a day will be helpful in keeping the bowels of the brood sow in good condition.

The following tonic will also be found useful:—Equal parts of pulverised copperas, Glauber's salts, Sal. soda, common salt, and a double portion of powdered charcoal, which should be thoroughly mixed and put in a covered trough (self-feeder), where all the pigs can have free access to it.

Paralysis from Kidney Worms.

The so-called kidney (or lard) worms "Stephanurus dentatus" (also called "Sclerostoma pinguicola") may cause paralysis of the hindquarters if these worms are present in large numbers in the sublumbar or loin region. These worms, in the embryo stage, migrate into the fatty tissues around the kidneys, and sometimes into the kidneys and other organs, as the liver and pancreas. They produce inflammation, and at times abscesses, in the tissues where they lodge. As they are found in largest numbers in the kidney fat and loin region where the nerves are given off from the spinal cord to the hindquarters, the functions of the nerves of this region are more likely to be affected by these parasites and their toxic products.

Treatment.—A brisk rubbing or massage of the loin muscles, with an application of the liniment already mentioned to stimulate the nerves and increase the blood circulation of the affected region will be helpful. Turpentine should also be given internally; this will destroy many embryo worms in the intestines. As turpentine is very diffusible, it is believed to be useful in destroying these parasites in the tissues around the kidneys. To a 200-lb. pig give a tablespoonful of turpentine in half a pint of oil (cotton-seed or raw linseed); or warm milk may be substituted for oil. Shake well before using. Use a small-necked bottle, drenching horn, drenching bit, or old leather shoe with a small hole cut out in the point, and give the drench slowly, or smaller doses may be added to the slop (food). The following worm remedy is also useful:—Santonin 6 grains, calomel 4 grains; this quantity to a bacon pig 100 lb. live weight or twice the amount to a pig weighing 200 lb. or more live weight.

In every case, the bowels should be completely emptied before the medicine is given. The Santonin (or Areca Nut may be used in similar quantities) and calomel should be mixed thoroughly with a small quantity of dry meal or shorts (pollard), which may then be moistened and fed alone, or the meal and medicine may be stirred into the feed or slop. Repeat the treatment in a few days.

As a preventive, use freshly slacked lime liberally over the pig yards to destroy worm embryos on the ground over which the pigs feed. Give the pig yards a thorough liming and clean up several times in the year.

Paralysis from Heavy Suckling.

Brood sows that do not have a proper ration, or that are not able to utilise it effectively, sometimes go down in the hindquarters from suckling a big litter of rapidly-growing pigs. The rapid growth of the pigs require considerable protein for muscle building and considerable bone-making material. All this must be supplied through the milk of the mother, and if the sow is not given the correct ration, her own muscles and bone tissues are depleted to supply proper elements for the growth of her pigs and the weakened condition mentioned results. This can usually be prevented by giving a food rich in protein and bone-making materials along with a corn ration. Protein supplements, such as ''tankage'' (meat or blood and bone meal), and linseed meal, should be provided. Protein may also be supplied by leguminous crops—clover, alfalfa (lucerne), cowpeas, and soy beans. Brood sows that have access to a feeding rack that is kept full of ''pea green'' lucerne or other legumes will have no trouble in supplying their pigs with both muscle and bone-forming materials, and will not be in much danger during their lactation period of going down in the hindquarters from too heavy a drain on their tissues. A little crushed wheat or corn and bran made into a slop with buttermilk is an excellent prescription, especially for sows that are low in condition from suckling large litters of pigs. Heat the milk nearly to boiling point for a few minutes before adding the grain constituent; this will prevent any possibility of transmitting tuberculosis or other diseases to the brood sows through cow's milk.

Paralysis from Lumbago or Rheumatism.

A board off the pig pen may permit a cold draught to blow on the back of the pig at night. This chilling of the loins may produce lumbago, or temporary paralysis of the muscles of the hindquarters and inability to walk. Comfortable sleeping quarters prevent these troubles (as well as pneumonia, &c.). It is a mistaken notion that the thick layer of fat with which pigs are provided is sufficient protection against winter storms. On the contrary, pigs often suffer severely from cold and wet if not properly sheltered and properly bedded. If the pigs are affected with lumbago and rheumatism, clean out the bowels by means of a brisk purge (two to four tablespoonfuls of Glauber's or Epsom salts administered in a pint of warm water). Cut down the protein constituent of the ration; feed thin, warm slops to which baking soda is added in tablespoonful doses. Apply hot packs to the loin and paralysed limbs, massage the muscles and apply a stimulating liniment with brisk rubbing. Bed warmly and cover the body of the patient with a thick horse rug if the weather is cold.

A Peculiar Ear Disease Possibly Mistaken for Paralysis.

Reference has also been made on several occasions in these columns to investigations that have recently been carried out by H. R. Seddon, D.V.Sc., and H. R. Carne, B.V.Sc. of the Veterinary Research Station, Glenfield, New South Wales (as reported in the "Agricultural Gazette" of New South Wales), these investigations having as their objective the determination of the cause and effect of a peculiar disease technically known as suppurative otitis affecting the ear of the pig, the principal symptoms of which are the abnormal carriage of the head and the interference with equilibrium and sense of direction. This disease which, unfortunately, also is all too common in Queensland and is frequently mistaken for paralysis or as indicating the development of paralysis of the hindquarters, has been described by these veterinarians as follows:—

A condition has been noticed fairly commonly amongst young pigs in which the most prominent symptom is a peculiar alteration in the carriage of the head, which is accompanied frequently by unsteadiness of gait. The disease is seen usually in young pigs from a few weeks up to three or four months old. The reason for the relative infrequency of occurrence in older pigs is possibly that young pigs are more prone to catarrh (which appears to be the forerunner of the condition) and that affected animals suffer such loss of condition that they die or are killed as "runts" or "bad doers."

Symptoms.

The most characteristic symptoms are the abnormal method of carriage of the head and the interference with equilibrium and sense of direction. The head is twisted or rotated to one side or the other so that one ear (the affected one) is depressed, such depression becoming more marked as the condition advances. It is noticed that the animal, when walking about, tends to circle in one direction, this being towards the side to which the head is depressed. For example, if the left ear is affected, the head will be rotated to the left with depression of the left ear and "circling" will occur in the same direction. At times this tendency to circle is not apparent, but it is noticed that when moving, the animal does so with an awkward gait, whilst the head is moved from side to side in an unbalanced manner. Affected animals may also exhibit considerable difficulty in going straight up to the feeding trough, having to make several attempts before gauging the right direction, sometimes walking to one side of the trough and sometimes to the other. It has frequently been noticed that the condition is accompanied by discharge from the nostrils and eyes.

In advanced cases there are very apparent disorders of equilibrium, the gait becoming unsteady and somewhat inco-ordinated, and the animals may fall into the feed trough and be unable to get out again.

Affected pigs are usually found to be "poor doers" showing a scurfy condition of the skin, lack of lustre of the hair, and poor condition. The appetite is capricious. In some cases examination of the affected ear reveals a considerable amount of yellowish brown or brown sticky discharge adhering to the inner surface of the ear.

Cause and Lesions.

Examination of several pigs showing such symptoms has revealed the presence of a suppurative condition affecting the middle ear, and this may be the only demonstrable pathological change found on post-mortem examination.

The hearing apparatus, it may be mentioned, consists essentially of three parts:—

(1) The external ear, which is that portion visible externally. Its function is to collect sound waves and transmit them by means of a passage to—

(2) The middle ear: This is separated from the external ear by the tympanic membrane or "ear-drum." The function of the middle ear is to magnify the sound waves collected by the external ear and transmit them to—

(3) The internal ear: This consists of an intricate structure by which the sound impressions are transmitted to the sensory areas of the brain. The internal ear, however, performs another very important function—namely, the maintenance of equilibrium, it being by means of part of this structure that an animal keeps its balance. Disease of these deeper structures of the ear, therefore, frequently leads to an unsteady gait, twisting of the head to one side, or even to inability to stand at all.

Both the middle and internal ears are situated within the petrous-temporal bone of the skull and it is within this bone that the lesions responsible for the condition are found. The petrous-temporal bones are placed immediately behind the articulations of the lower jaws and the skull, but a careful dissection by sawing open the skull along the longitudinal mid-line and removal of the brain is necessary to expose them properly.

In several cases so examined, it has been found that a thick, cheesy material is present in the cavities of the bulbous portion (*bulla ossea*) of the middle ear on that side to which the head has been depressed during life. Normally, these cavities in the bone have a honeycombed appearance, consisting as they do of small, empty spaces separated by thin plates of bone.

The accumulated pus in the middle ear tends to burst through the ear drum and discharge externally, giving rise to the sticky discharge which may, in advanced cases, be seen on examination of the passage in the external ear.

Examination of the pus shows the presence of bacteria, such as are commonly met with in other suppurative conditions in the pig. It is probable that in these cases they gain entrance to the deeper structures of the ear by way of a narrower passage (called the Eustachian tube) which leads from the back of the throat to the middle ear, and from the comparative frequence of nasal catarrh in young pigs, it is probable that this ear disease is an extension of this inflammatory process affecting the lining membrane of the nasal passages.

Prevention and Treatment.

Once the condition is established, it is unlikely that any treatment will be of use. Syringing of the outer ear will remove the obvious discharge, but will not penetrate into the deeper structures from which the pus arises. While the discharge cannot be definitely prevented, all possible means, such as proper attention to cleanliness and housing, should be undertaken in order that chills may be avoided. Diet should also be attended to, as it is found that this also plays a not unimportant part in the causation of those diseases, such as catarrh (snuffles) and pneumonia with which the condition is frequently associated.

More Efficient Feeding Necessary.

As will be noted from the remarks of the authorities referred to above, both in regard to the condition, paralysis of the hindquarters, and to that more recently described by Doctors Seddons and Carne, it is apparent that any form of treatment must be preceded by a general clean up of all the piggery buildings, yards, paddocks, &c., careful attention to breeding, and to the selection of reliable, healthy strains of pigs with which to stock up farm piggeries, to a more efficient system of feeding pigs, and to the use of mineral matters in the food given to pigs of all ages. It will be noted that special emphasis has been given throughout to the consistent use of liberal supplies of green food, lucerne, rape and barley, corn, pumpkins and melons, sweet potatoes and other root crops, grasses, and to any other green foods available on the farm.

Mineral Mixtures.

The preparation and use of mineral mixtures is especially worth attention, for they will be found of great value in all seasons whether the supply of green food is available or not. In this connection the following recipes are suggested as being suited for use on all pig farms; the ingredients are reasonable in price, and are not difficult to obtain, and it should not be difficult for any farmer to arrange for a supply of these very necessary additions to the pigs' diet.

Mix together—Charcoal, 20 lb.; hardwood ashes, 20 lb.; coarse salt, 8 lb.; air-slaked lime, 4 lb.; flour of sulphur, 4 lb.; powdered copperas (sulphate of iron), 2 lb.

Prepare as follows:—First mix the lime, salt, and sulphur thoroughly, then add the charcoal and ashes. Dissolve the copperas in two pints of hot water and sprinkle over the whole mass, mixing thoroughly.

Keep some of this mixture before the pigs at all times in a strong box securely fastened in a weather-proof corner of the sty. Provide ample clean cold water at all times.

Lime water should be added to the morning feed, using half a pint to each two gallons of food. It will also pay to add a few ounces of sterilised bone meal to the food of the growing pig. This meal can be ordered specially for this purpose from any of the leading dealers in artificial fertilisers or from firms like Messrs. Thos. Borthwick and Sons (Australasia) Ltd., Wharf street, Brisbane, who also manufacture meat meal—a protein supplement of much value, and Bonolik, a mineral mixture. It may seem that these condiments are expensive and unnecessary, but in

Manuring for Milk

Although various means are advocated for increasing the milk flow, the question of manuring their pastures has as yet received little or no consideration by the dairymen of Queensland. If they could only be brought to understand the great benefit to be derived from top-dressing their paddocks with superphosphate, it would probably do more to increase their returns than anything else.

During the last five or six years a great deal of attention has been devoted to conducting experiments in top-dressing in New South Wales, Victoria, South and West Australia; and, as they have proved almost uniformly successful, dairymen are now beginning to adopt the practice more generally. Carefully conducted experiments in the Southern States proved conclusively that not only can the stock-carrying capacity of paddocks be doubled, but that it will maintain twice the number of cows and young stock in far better condition. Not only this, but they find they obtain considerably more milk per cow having a higher percentage of butter fat.

The top-dressing of both natural and introduced grasses such as paspalum has produced wonderful results, and in some cases has doubled and even trebled land values in certain districts.

There is no doubt that the practice of "manuring for milk" has opened a new era of prosperity for dairymen and has come at a time when it was most needed. Through the deterioration of pastures, it was only possible to carry half the number of dairy stock than formerly, and even with the assistance of fodder crops it proved difficult to keep them in good condition at certain times of the year. The result was that unless a dairyman was on an exceptionally favoured piece of country he was finding it extremely difficult to make ends meet.

There seems every reason to believe that the condition of the dairying industry will soon improve for the better, and that this will be mainly brought about by the general adoption of the practice of top-dressing with fertilisers.

For further information and pamphlets write to—

Shirleys Fertilizers Pty. Ltd.

OFFICES AND WAREHOUSE:

Little Roma Street, Brisbane

Works and Laboratory: At Gladstone

Make the Utmost Use of Your Feed

AT a time such as the present when large areas are suffering from extreme shortage of feed—both in quantity and quality—it is essential that utmost use be made of your feed.

Hand feeding is a costly process at any time, and more especially at present owing to short fodder supplies, but by the judicious use of VITA-LICK animals are enabled to derive the full benefit from the feed they eat.

Vita-Lick used constantly (double strength "D" under extremely dry conditions) has been proved of great value. Therefore, make the utmost use of your feed by using VITA-LICK at all times.

Mr W. T Merriman, of Yass, N S W, on 23rd March, 1926, writes—

> "I am fully satisfied with the results obtained from VITA-LICK. The majority of sheep last season cut from 2 to 3 lbs. less wool than the previous year (1924) whilst my sheep on Vita-Lick cut a heavier fleece for the same growth"

Mr. G. H. Wiseman, of Garthowen Estate, Attunga, N.S.W., on 21st February, 1926, writes—

> "Re VITA-LICK—I have been a constant user of it since it first came on the market, and I feel more confident each day of its value. In ordinary seasons it is good for sheep, and in bad times, well, I, for one, could not keep any sheep without it."

VITA-LICK LIMITED
Stock Lick Specialists
107 KENT STREET SYDNEY

actual practice they will give a handsome return on the outlay, though it might be difficult to demonstrate this in actual pounds, shillings, and pence.

The provision of these mineral mixtures will satisfy the pig's desire for mineral substances and will prove of added value as a tonic and appetiser. Salt licks, Vita licks, &c., also are now available on the market, and are becoming increasingly popular each year.

Minerals are just as important in the growth and development of the pigs as are proteins, carbohydrates, fats, vitamines, ash, water, and other nutrients, and more attention should be given to their provision, because, as a rule, insufficient quantities are present in the ration.

All pig rations, of course, contain some minerals, but there are practically no pig rations, unless specially prepared, that contain an adequate quantity to meet the requirements of the pig's body. Pigs need minerals for the building up of bone, for making muscle, for cell division, and for carrying on of innumerable physiological functions.

Without minerals, growth and development will be restricted, and the pigs will be less profitable. Many pigs suffer because they receive inadequate quantities of minerals, but no pigs suffer because too large quantities are given to them. Consequently, we should see that our growing pigs have access at all times to a good mineral ration balancer.

Corn Cob Charcoal.

A good use for the corn cobs (cores) that have always been allowed to accumulate on most farms and around piggeries is to make charcoal of them. The cores in themselves do not make a good feed for pigs because of their high and coarse fibre content, and even if the whole cob (corn and core as well) is ground, it has yet to be proved that there is an added value in them. The core is practically indigestible fibre that only burdens the pig's digestive organisation and causes indigestion.

After the pigs have taken all the corn from the cob, however, the waste cores can be raked together into a pile and burned to the point when it is all a live mass of coals. Water should then be sprinkled over the pile to put the fire out, and the partially charred cores gathered up for the pigs. If there are any other "chips" available, or any old corn husks, these should also be gathered and burned, and added to the charcoal made from the cores.

Some of the farmers in the "Rivers" district of New South Wales have for years followed this practice, and in these days when suction gas plants are in use to such an extent, quite a large trade has sprung up for the charcoal burner. In this case large pits are dug in the ground and suitable lengths of logs are pulled into these; they are then fired, and after a time are covered with earth. In a few days' time a good class of charcoal results. These farmers have been making good money, and, at the same time, clearing their holdings.

It pays also to burn all old bones, waste timber, &c., and to thus convert these into a form of charcoal.

Provide More Water.

The water supply should have special attention, for certain it is that many pigs do not have a sufficient supply of clean drinking water, and, as a general rule, pigs from a few days old upwards will be found to appreciate liberal supplies; it is surprising how much water a pig a month old will drink if he has the opportunity of securing a supply.

Careful Handling in Transit.

Many pigs are handled so roughly in transit to market that they arrive at the markets, factories, &c., down in the back or otherwise disabled.

The writer has seen hundreds of cases like this in which the animals have been unable to walk from the railway trucks. The industry suffers heavy losses each year as a result. It should be the duty of every farmer to see that not only his own, but that all other animals in transit to market are handled carefully, and that no undue haste is made in rushing the animals into trucks or other means of conveyance.

The Condition of the Breeding Sow.

Reference has been made above to the fact that frequently breeding sows suffer from paralysis of the hindquarters as a result of loss of vitality and condition from suckling a large litter of thrifty, vigorous pigs. In this regard it is necessary that the breeder should know the correct condition in which to maintain his breeding sows.

Figures shown represent sows that are too low in condition to farrow and rear their litters successfully. These sows would, in all probability, suffer severely as a result, and their progeny could not be regarded as having the same chance as the progeny of the sows illustrated which represents the normal condition of breeding sows, the condition in which a sow should be maintained for best results; sows that are too fat are likely to have trouble at farrowing time, and their progeny will frequently prove to be weak, puny, and unable to battle for themselves.

The importance of diet and the necessity for careful attention to all details of management are strikingly illustrated in the plate from Henry and Morrison's latest book on "Feeds and Feeding."

Overfeeding Young Pigs on Corn—A Cause of Paralysis of the Hindquarters.

The importance of properly balanced rations cannot be too strongly stressed. Many bacon pigs suffer from paralysis of the hindquarters as a result of being overfed on a ration consisting almost exclusively of corn and water or even of corn and milk; in fact, many authorities condemn the use of corn as a food for young pigs, but the writer's experience demonstrates that, provided corn is fed in comparatively small quantities during the early stages and is well balanced up with liberal supplies of milk, green stuff, &c., that it can be fed to very considerable advantage to all classes of pigs. In these days there is no demand for heavy fat bacon, hence there is no profit in over-feeding pigs on expensive grains, though some grain is necessary, especially in the case of young growing pigs.

Departmental Suggestions.

Paralysis in pigs is brought about by several causes in addition to the other causes referred to above—viz., deficiency of vitamines, &c. In these cases the following lines of treatment are suggested.

Treatment.

If due to rheumatism, see that the pigs are housed at night in a dry place, and allowed to sleep on wood flooring instead of on concrete or earth. Give daily salicylate of soda 15 to 30 grains, and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms give, in the food or as a drench, 1 teaspoonful of oil of turpentine, 20 drops of perchloride of iron, and 3 or 4 oz. of raw linseed oil. This is sufficient for 50 lb. body weight.

It should be given after the animal has been fasting for some hours, and can be repeated several times, with an interval of three or four days. When due to feeding, as mentioned above, stop the corn and give once daily in a mixed diet or in milk 1 dessertspoonful of the following powder for every 100 lb. body weight (after it has been well mixed and powdered):—Sulphur 2 oz., sodium bicarbonate 4 oz., sodium sulphate 2 oz., black antimony 2 oz., sulphate of iron 1 oz., wood charcoal 2 oz.

A useful mineral mixture well worth trial also is made up as follows:—Add 1 dessertspoonful of the following mixture to the food of each pig daily:—Sulphate of iron, 1 part; sulphur, 2 parts; sterilised bone meal, 10 parts. Very young pigs should receive about half these doses. The following excerpt is also of interest in studying this peculiar disease, Paralysis of the Hindquarters.

Causes.

When asked why pigs go down behind and suffer from a form of paralysis, Dr. K. W. Stouder, an Extension Service Specialist at the Iowa State College, U.S.A., said—

Weakness of the legs and back to such an extent that the animal is unable to stand is commonly seen among pigs. It is seen more often in recent years, perhaps, than it was some years ago.

We must not assume that it is all caused by the same thing, nor that all cases are exactly alike. In fact, they can easily be divided into at least two groups, the old sow that goes down and the growing store pig. Most sows do down after suckling a vigorous litter of pigs, and such cases are usually due to a lack of enough minerals, proteins, and vitamines in the rations to support the litter she raises and to provide for her own body-maintenance needs as well.

Many of these cases recover as the experienced feeder knows, if the patient is put on a ration of whole cow's milk every day, as it supplies the deficiencies, but it is more important to remember that this type of going down behind would not have occurred had the food ration been well balanced during the gestation period and while she was suckling her litter.

Young pigs may also go down because of the unbalanced rations, particularly it seems if the ration is low in mineral content and of the vitamines so essential to good health. It may also result from generations of breeding and selection, together with forced feeding for early maturity, rapid gains and excessive fat production, disregarding constitution, good bony framework and vigour. Cases of this kind are common, we believe, and they strongly indicate why these animals and their close relatives should be discarded as breeding animals to perpetuate the herd, for in such cases predisposition has much to do with its occurrence. Its occurrence one generation after another in certain families can thus be accounted for in part at least.

Some animals that go down show deficiency of bone; some show degeneration of nerves that control the muscles of the back and legs; others are found to suffer disease of the bony surfaces that come together at a joint, particularly where the thigh bone attaches to the body. These lastnamed cases of diseased joints may be the result of navel infection during the first few days after birth and could have been avoided had the pig been farrowed in a very clean place and kept under the cleanest surroundings, together with iodine or other antiseptic treatment of the navel until it dried up.

Difficulty of Diagnosis.

The treatment of these cases gives variable results, perhaps depending first upon the difficulty of diagnosing with certainty the exact trouble in each case presented for treatment. Some cases improve on a mineral mixture, especially if given calcium phosphate, and others do better on spoonful doses each day of cod liver oil because the latter is rich in vitamines.

It is suggested that breeding animals and growing animals be given well balanced rations, so far as providing plenty of protein is concerned in relation to the fattening foods; that minerals be kept available and a mixture of equal parts of air-slacked lime, salt, and bone meal by weight serves as good as any.

Preventive Measures.

When young pigs are born, apply tincture of iodine to the naval daily until it is dry. Don't keep even the relatives of the pigs that show this trouble for breeding purposes. When it occurs, give whole milk, cod liver oil, calcium phosphate, and carrots, if you have them available, in addition to a well-balanced ration and some cases will recover, but there are those that never get up though appetite and general health otherwise seem good.

There are cases, of course, in which the ailment is due to accident. The treatment for these cases must be on common-sense lines, and must aim at keeping the animal in good heart and in otherwise healthy condition. There are other cases in which intestinal worms, and possibly kidney worms, are the direct or the indirect causes; these cases must receive a course of treatment that will tend to clear them of the parasites and put them in a condition to battle against future infestation.

Another American authority has this to say on the subject:—

"Professor L. A. Weaver, swine specialist of the Missouri (U.S.A.) Agricultural College, states that the two minerals most frequently lacking in the food for pigs are calcium and phosphorous. Experiments have shown that pigs are able to use these minerals when supplied either in an organic or inorganic form. In other words, ground limestone, which is calcium or lime phosphate, serves as well as a source of phosphorous as does wheat bran, where the phosphorous is in an organic form. Calcium may be satisfactorily furnished in almost any form, such as lime, ground limestone, or bone meal."

Included among suggested remedies by other authorities as well as by our own experience in handling animals in a paralysed condition are as follows:—

Where animals have the benefit of a grazing area, it would be an advantage, if possible, to subdivide this, allowing them to use only one portion at a time, the other portion resting and sweetening up meantime. Where the ground is at all swampy or low lying, some endeavour should be made to drain the area. It is on these low lying, swampy areas where infection from kidney worms or from intestinal worms would be suggested, hence the advisability of changing the pigs from one pasture to another frequently. Pigs infested with kidney worms, however, seldom recover normal condition, though they may appear perfectly healthy and have good appetites. There is, unfortunately, no external indication of the infestation unless paralysis be accepted as a definite symptom.

Results of Experiments.

A series of experiments carried out at one of the Agricultural Colleges in England demonstrated that pigs fed on an exclusive corn diet have a weaker bone than those having a better balanced ration. If, therefore, animals are receiving corn alone, other foods, especially skimmed milk and green foods (with minerals), should be added to make up the deficiency.

Within the last year or two, a very extensive investigation overseas regarding this disease, has demonstrated among other things that pigs affected with paralysis of the limbs have a broken down condition of the nerves that supply the muscles of the hind limbs with innervation. While it is possible that this is not always the case, still it was found in a large percentage of the patients examined, and as degenerated or broken down nerves cannot be restored to their full function, we are forced to come to the conclusion that paralysis of the hind parts of the pig is, in many cases, incurable. The cause of this breaking down of the nerves is not known, and, therefore, intelligent curative treatment cannot be recommended. Preventive treatment is always somewhat vague, but it is always well to separate the diseased from the healthy pigs, to disinfect all pens by spraying them or by the application by hand of limewash, and by avoiding the use of affected pigs or pigs closely related to them for breeding purposes, as there is some danger that there may be a hereditary predisposition to the disease.

In cases due to accident or injuries, common-sense methods must, of course, be employed in treatment. Meanwhile, the animal requires careful housing and a course of medicinal treatment to keep the bowels and bladder free. The food should be of a soft, nourishing nature. Allow water and green food also.

The use of cod liver oil appears to have the general recommendation of a number of investigators handling paralysed pigs. This oil given at the rate of one teaspoonful per pig (from 6 months old upwards) daily, mixed in the food is suggested.

Another remedy recently suggested in dealing with the disease as one due to a deficiency of mineral matters and to a lack of vitamines, indicates that something needed for nutrition is absent in the foods in use for the affected pigs. The Colorado Agricultural College authorities in answering an inquiry on these lines recently give this advice, "That as the foods being fed to the animals under review had on analyses shown a deficiency of minerals, and were particularly deficient in vitamine B., it was recommended to try feeding the pigs on a ration consisting of plenty of milk and carrots, using new milk for a start and skimmed milk later. Results under experimental work with this ration in case of pig paralysis have been remarkable.

An Incurable Form.

Paralysis resulting from tuberculous bones is incurable, and as the carcasses would not be fit for human consumption the sooner they are destroyed the better. It is, of course, possible to test pigs with the tuberculin test, though this is not a very satisfactory business with pigs for the reason that it must be carried out by a competent veterinarian and the expense incured would hardly be justified except in the case of very valuable stud pigs.

If there is any conclusive evidence that the animal is tubercular, he had better be destroyed immediately and be burned to ashes on the spot on which he is killed.

In addition to paralysis resulting from tuberculous bones, any abnormal condition affecting the spinal cord, such as abscesses tumours, parasites, or even diseased and softened bones may be a primary cause for the trouble. Paralysis immediately following farrowing is, in our experience, not common, but it may result from a weakened condition of the animal and in cases of this description the preventive measures indicated should be adopted, as also in cases attributed to lumbago and rheumatism.

Early Signs of the Trouble.

As a rule, paralysis comes on gradually, being indicated in the first instance by a wobbly, uncertain gait, the animal failing to control its movements, particularly if hurried or if the animal is turning around. Walking gradually becomes more difficult as the weakening of the nerves and muscles of the hindquarters progresses, but in almost every instance the appetite and general health of the animal is not affected, hence any abnormal change in the appetite or any other indication of sickness must be looked to as premonitory of other and perhaps more serious troubles. Constipation must be relieved by repeated doses of Epsom salts or castor or linseed oils. Massaging of the affected muscles and the application of liniments as referred to above are suggested.

Finally it is suggested that in every instance where the trouble appears in more than one animal, or where it appears that ordinary care and attention is ineffective in bringing about the desired result, the services of a qualified veterinary surgeon should be requisitioned to take complete charge of the case.

Plate 133 (Fig. 1).

A typical case of Paralysis of the Hindquarters. It will be noted that although paralysed in the hindquarters to the extent that she cannot raise her hind legs or use them in any other way, the animal has not lost condition. Strangely enough, the appetite is not usually affected provided the animal is otherwise normal.

Plate 134 (Fig. 2).

These pigs are suffering from a very severe attack of paralysis of the hindquarters. The pig on the right is still able to move about but with great difficulty and a very uncertain gait, but as is the case with the other two is quite unable to control its movements. The photograph is of pigs fed on a ration containing a very low mineral content. Stiffness and partial loss of control followed after about six weeks feeding. In the same experiment a second lot fed the same ration plus five times as much calcium phosphate as lot No. 1 had gained 89 per cent. more weight and were not affected with paralysis. Both lots were afterwards slaughtered. The skeletons of the pigs illustrated in Fig. 2 weighed 1,193 grams. That of the pigs fed in separate pen and which were given sufficient calcium phosphate weighed 2,371 grams, or 100 per cent. more.

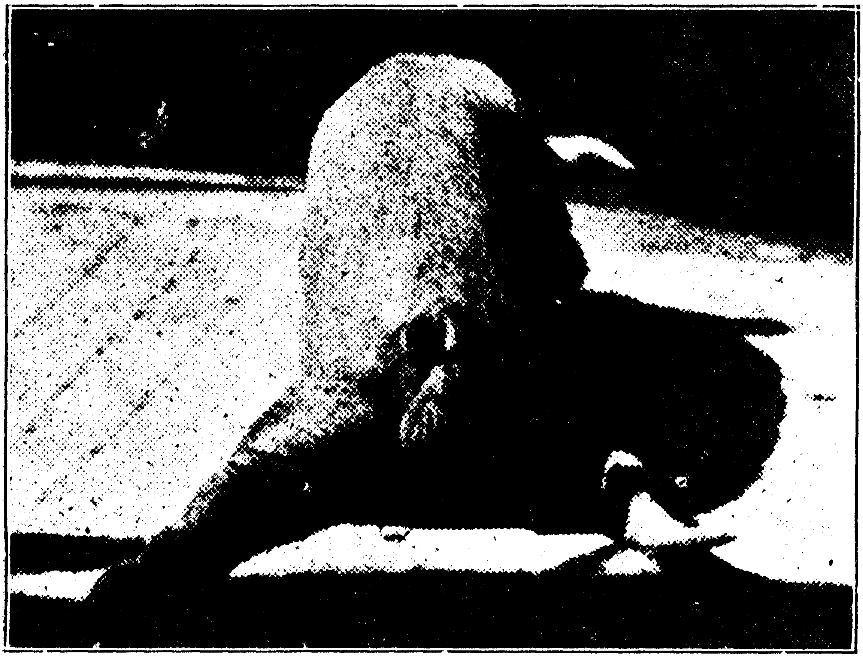


PLATE 135 (Fig. 3).

Symptoms of posterior paralysis (breaking down in the back).

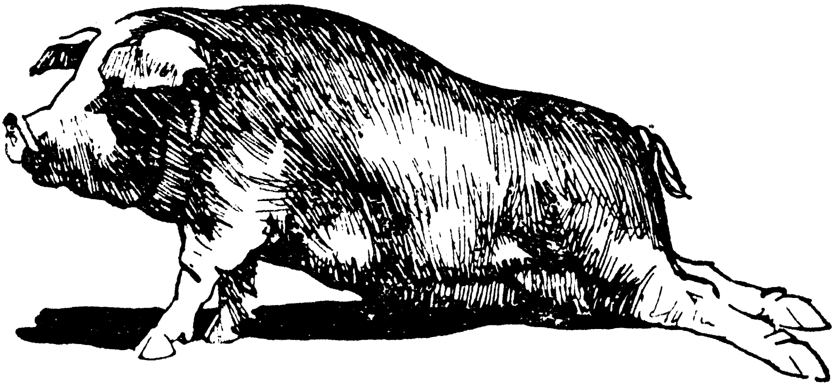


PLATE 136 (Fig. 4).

Illustrating a pig that has been injured in transit and unable to travel. Many pigs arrive at our bacon factories and saleyards in such a condition, resulting in their market value being reduced probably 75 per cent. This emphasises the necessity of giving careful attention to the animals in every stage, particularly in transit.

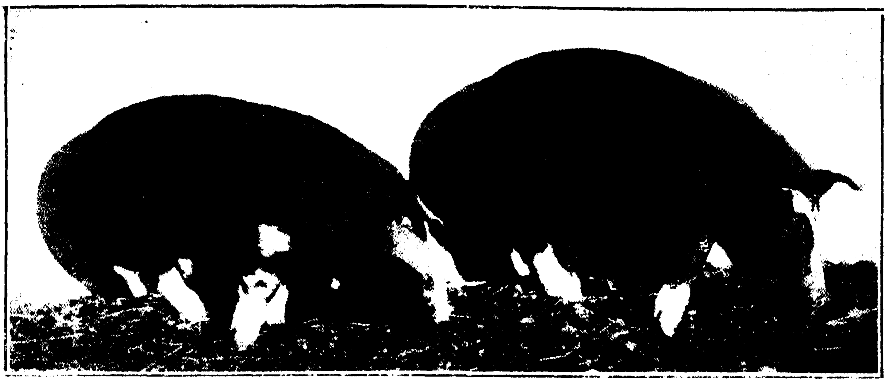


PLATE 137 (Fig. 5)—PIGS SUFFERING FROM SEVERE CASES OF RICKETS.

These pigs received a ration of white corn and skim milk, without pasture. Note the paralysed condition. The pig on the left died within a week after the photograph was taken, while the one on the right gradually recovered when cod-liver oil was added to the ration

(From Henry and Morrison's "Feeds and Feeding.")

These pigs are suffering from an advanced form of the disease Rickets, a similar condition to that referred to as paralysis of the hindquarters. The reference to this illustration emphasises the necessity of careful feeding and the provision of a liberal supply of mineral matters and vitamins in the food.

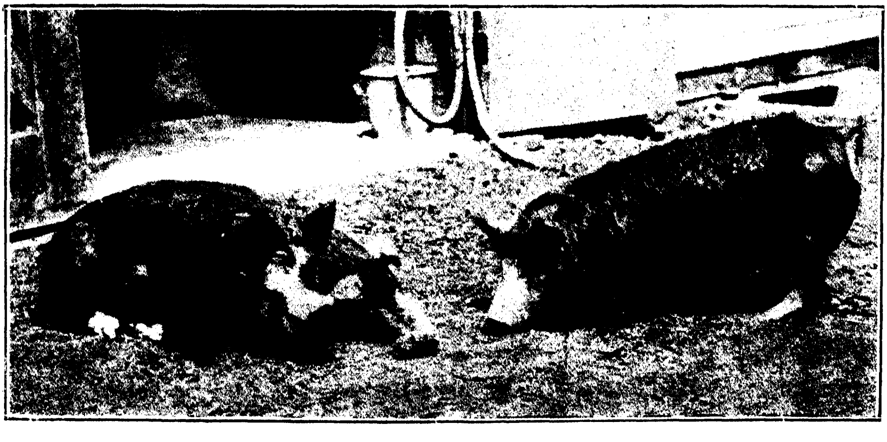


PLATE 138 (Fig. 6).

These pigs were raised at the Wisconsin Station (U.S.A.) on grain and grain by-products, without pasture or any other food. They became stunted, and finally developed the severe paralysis depicted. The proteins in such a ration are unbalanced in composition; there is a deficiency of mineral matter, especially calcium; and there may be a lack of vitamines. (From Hart, Wisconsin Station, in Henry and Morrison's "Feeds and Feeding.")

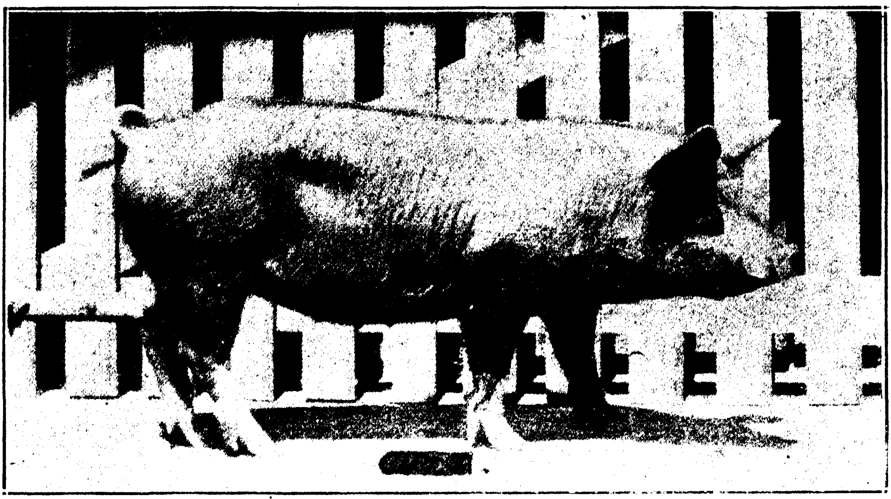


PLATE 139 (Fig. 7).

PLATE 140 (Fig. 8).

Figs. 7 and 8 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 7 is too low in condition to mate to the best advantage, while the sows shown in Fig. 8 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders as their breeding is doubtful and there are plenty of better type sows available at prices comparatively low.

Fig. 9 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from troubles such as heat apoplexy as well as paralysis. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers on the same steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening.

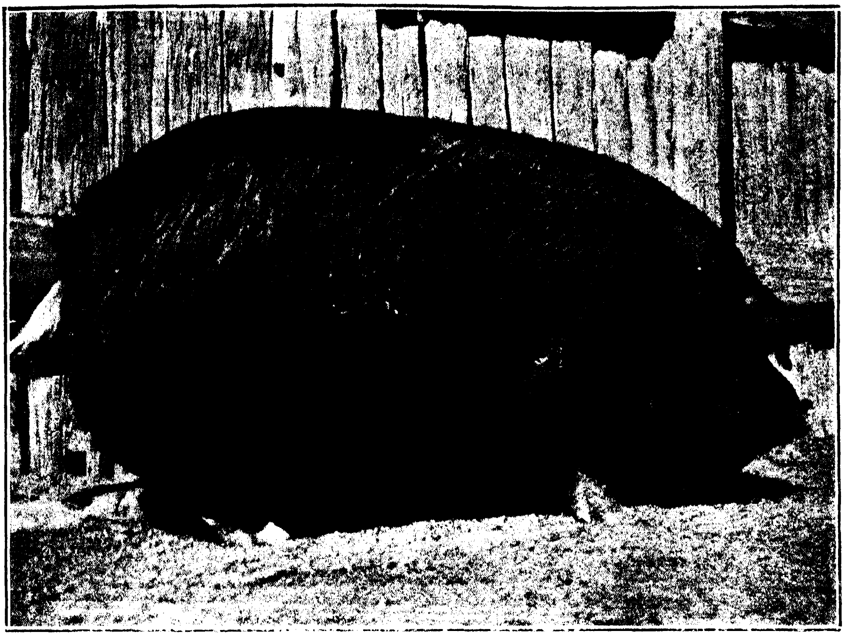


PLATE 141 (Fig. 9).

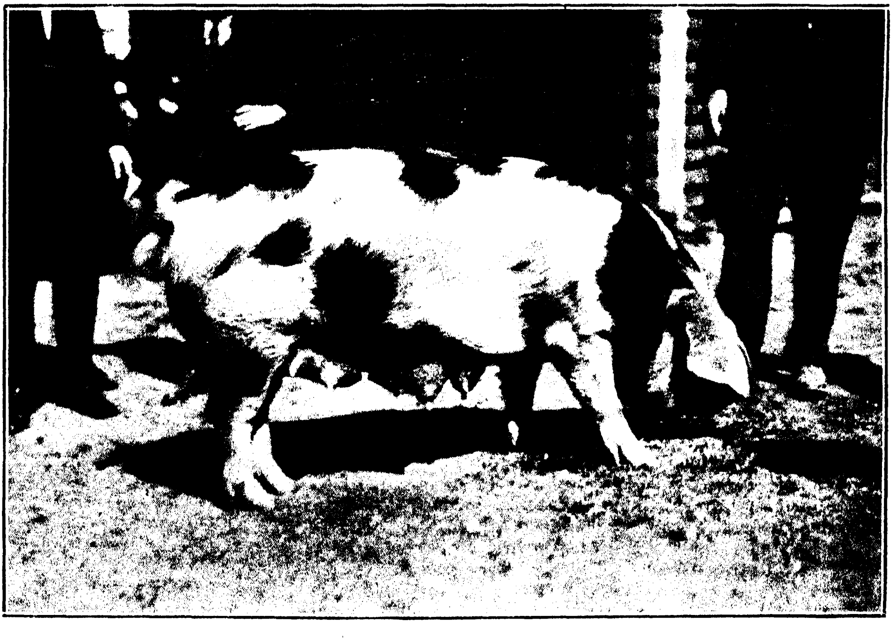


PLATE 142 (Fig. 10).

Fig. 10 is a prize-winning Gloucester Old Spot sow at the Brisbane Show, 1925. This sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her pigs.

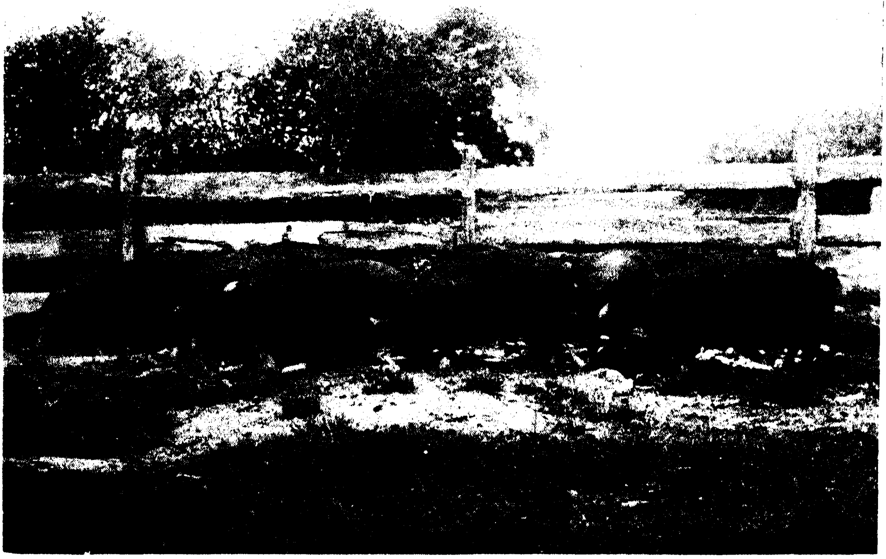


PLATE 143 (Fig. 11).—A GROUP OF SELECTED BERKSHIRE BROOD SOWS.

Sows of this description always realise good values in normal seasons, and are worth special care.

Fig. 11.—Berkshire sows in medium breeding condition, the condition conducive to satisfactory results. This is the ideal condition for in-pig sows, for they will farrow with little or no trouble and be able to rear their litters satisfactorily and without risk of going down in the hindquarters or suffering from other diseases.

TICK PARALYSIS IN PIGS.

A correspondent informed us recently that he had a well-grown, three-months-old sow that had become suddenly very ill; she went off feed and lay down. On rolling her over, the owner found a whitish coloured tick (known as a dog tick), and he sought information as to suitable treatment for an animal so affected.

Another correspondent advised: "I have recently purchased three first-class Middle York sows, three months old. They were in perfect condition when they arrived here, and have been well fed and cared for since, but two days ago I noticed that two of them were suffering from some ailment or other; they would not come up for their food, were very stiff and 'dopey,' and appeared to be getting worse. I am at a loss to know what is wrong or what to do . . ."

The following information was supplied:—The fact that the ailment suddenly manifested itself in the pigs suggests that it may be attributable either to bush-tick poisoning or to severe constipation. The common bush-tick fastens itself on the animal, usually about the head, ears, neck, or under the foreleg, and the poisonous effect of its bite causes a temporary paralysis of the hindquarters (particularly) and frequently severe constipation. These ticks (*Ixode holocylus*) are comparatively common along the coastal districts of New South Wales and Queensland, and one species is found inland. They generally attack dogs, poultry, and pigs; but other animals are not by any means immune, nor even are human beings. After attaching itself to the animal the tick forces its feeding apparatus through the skin (it usually selects a thin-skinned portion of the body for its temporary abode) and commences to suck blood from the affected part. The tick gradually fills up, increases to two or three times its normal size, and at the same time apparently injects a certain amount of poison into the animal, the result being that the animal goes off its food, is disinclined to move from its bed, and when disturbed appears stiff, sickly, and paralysed, particularly in the hindquarters (later the forequarters may also be affected), breathing becomes laboured, and there may be a discharge from the nostrils; bowels are inactive and severe constipation follows; kidneys and bladder become inflamed and congested, and the urine is scanty and high coloured. If not attended to the animal gradually becomes worse, loses condition, and death occasionally results.

Careful search should be made for the ticks, and if found they should be cut off close to the skin with a sharp pair of scissors, or, better still, with a sharp razor. Do not attempt to pull the tick away. After cutting the tick off, rub the affected spot with antiseptic ointment, kerosene, or Stockholm tar.

Remove the pigs to a pen where they can be attended to regularly. Give each pig two tablespoonsful of castor oil in a half-cupful of warm milk as a drench immediately. About three hours after give each pig a mixture of one dessertspoonful of aromatic spirits of ammonia and ten drops of nux vomica (the chemist will make this up for you) in a small cupful of warm milk.

Compel the animals to take exercise; provide dry and warm, clean sleeping quarters, and treat the patients kindly for a few days. Give soft nourishing foods—milk, pollard, a bran mash, and similar foods.

Another remedy that has proved successful is as follows:—Give castor oil or olive oil as already advised, and an hour later give six drops of tincture of aconite each in a small quantity of warm water. Three hours later, if the patients have not recovered, give three drops of the same drug and repeat until four doses have been given; do not give more than four doses. Follow the instructions with regard to feeding and housing.

GROS MICHEL BANANAS.

This variety was introduced by the Acclimatisation Society, Messrs. Howard Smith and Sons, and this Department. Howard Smith's established a plantation in Mourilyan district.

Plants were propagated from single eyes from the departmental introduction and planted in various parts of the State, but for pertinent reasons were not considered suitable for general planting. Howard Smith's plantations were completely devastated by a cyclone (the Gros Michel is a very tall-growing variety). Mr. Hogg, Cardwell, propagated sufficient stock to plant several acres and found the variety difficult to handle, the psuedo stems each requiring support when bunching. Afterwards, a cyclone practically eliminated them.

Thrip is a pest in parts of North Queensland, and to dust the young fruit as required for this pest would mean carrying a step ladder to provide access to the bunches. The detrimental influences of high winds on this variety are severe and those of a cyclone are complete demolition. For this reason the Gros Michel has practically gone out of cultivation in Fiji and has been superseded by the dwarf-growing Cavendish.

The Gros Michel being essentially a tropical variety makes comparatively slow progress in the South. Its fruit being less curved has the advantage in packing and to some extent also in size, but under equally favourable conditions the weight of fruit from a given area is in favour of Cavendish, which also comes into bearing much earlier than any of the tall-growing varieties.

Possibly the Gros Michel may be a better carrier, but regarding the Southern Queensland product, it must be remembered that we are producing a tropical fruit under sub-tropical conditions. The effect may be gauged from the fact that bananas from Currumbin were found unfitted to rail beyond Melbourne, whereas they were satisfactorily sent to that destination from Cairns (also to Adelaide, though the latter were packed in a decidedly green stage).

That the Gros Michel is subject to "Panama disease" is a serious matter for consideration. This disease practically wiped out the Sugar banana, and has seriously influenced the production of the Lady's Finger variety. It may also be mentioned that an American investigator, Dr. Reinking, recently visited Queensland in search of a tall-growing banana, which was not susceptible and possessing a more sturdy stem to supplant the Gros Michel. Observation and experience suggest the Cavendish variety being quite immune from the disease, and its dwarf habit distinctly favours its planting. Before general planting of the Gros Michel can be recommended, even in the most favoured and sheltered northern distrists, it should receive further trial, and this not exceeding 25 per cent. of the area of any plantation.—G. W. WILLIAMS, Acting Director of Fruit Culture.

PUBLICATIONS RECEIVED.

PIG TESTING AND RECORDING FOR THE PURPOSES OF ADVANCED REGISTRY.

In an extremely interesting and informative brochure under this heading from the pen of Messrs. H. R. Davidson, M.A., Dip. Agric. of the School of Agriculture, Cambridge, England, and A. D. Buchanan Smith, M.A., M.Sc., of the Animal Breeding Research Department of the University of Edinburgh, an extensive outline is given of recent developments in animal breeding in its relationship to the registration of stock and the recording of pedigrees generally.

Though written by authorities exceptionally well versed in the scientific aspect of stock breeding and dealing with a technical subject, "Pig Testing and Recording" is extremely practical, and is written in a way that will readily be understood by producer, student, and expert alike.

In the opening paragraph attention is drawn to the belief that "the full benefit of the recently elaborated science of genetics or breeding will not be obtained until some standards of production are established . . . . That while the pail (or milk bucket) is the chief measure of the productivity of the cow, there are other things which must be considered before her value can be rightly gauged. With the hen the number of eggs laid during the year does not convey an adequate impression of the economy of any particular fowl. All the same, "to have any sane standard of production" (says the author) "is better than to have none. To have a standard that is easily measured gives the breeder of that type of stock a great advantage."

After stressing the importance of the great progress made in breeding practice within the past fifteen years, and after comparing results and urging an extension of the practice not only to the cow and the fowl but to the pig . . . . which next to the dairy cow is the most economical producer of food . . . . readers are supplied with a brief historical record of this progress and of the inauguration of a permanent system of stock recording and registry, and the latest extension of this scheme to recording not only the pedigree but the productivity of the pig. A pig with a pedigree, it is said, implies that it is aiming at something higher than the average. A pig with a record implies that it has achieved something higher than the average.

Origin of Pig Testing and its Development Abroad.

Pig testing as at present understood appears to have originated in Denmark, where in 1896 the first tests of thriftiness and quality were carried out on the farms of the breeders. In 1907 the first testing station was opened in that country, and since then two more have been established in different parts of the country. Some time previous to the introduction of testing, the Government had instituted a number of subsidised "breeding centres," something on the lines of the poultry stations in the British Isles, and in view of the rather strict supervision of these herds by State officials very full information relating to the breeding capacity of the stock was obtained by means of detailed private herd registers. The type testing station added to this breeding information details of the carcass quality and the economy of food consumption.

The small size of Denmark and the way in which the breeding centre scheme was organised resulted in the fact that a great part of the pigs fed commercially in the country originated from the breeding centres, and so the live stock authorities have been able in this way to keep considerable control over fecundity (the power to produce thrifty litters freely, regularly, and abundantly), quality, and thriftiness of the commercial pigs used throughout the country.

After drawing attention to the difficulties that would be experienced in Great Britain in inaugurating similar type testing stations, &c., the authors proceed to discuss the position in Sweden where the system has also been in successful operation. In general the methods followed in Sweden and the station established there has been "modelled very closely upon the Danish ones," and although only completed in 1923 it has already produced three most interesting reports.

A perusal of the results published indicates that "productivity" not only refers to increased production of "typy" pigs, but that considerable attention has been given to grading of the finished product, this grading having special reference to length and depth of side, measurement of back fat, thickness of side, &c. The fact that even in grade III. the back fat was only 1.80 inches suggests that sides with anything more than 2 inches of back fat are not good enough to be exported from Sweden.

Attention has been given also to thickness of belly, the objective being to increase the streakiness and commercial value of this portion of the carcass especially in its relation to the "side." Especially interesting is a comparison between hog meat (the meat from a castrated male) and gilt meat (the meat from a sow pig). When all the pigs are divided in this way, it is found (the authors say) that in the gilts (sows) the back fat is thinner and the streak thicker than in the case of the hogs. One interesting suggestion is made in this connection, and that is—that as the hogs grow rather faster and fatten at an earlier age it is conceivable that they might be used to best advantage for pork while the gilts could be kept back for bacon. Another interesting conclusion is stated in that with regard to depth of side the figures show that 59 per cent. of deep pigs are placed in grade I. as against 23 per cent. of the shallow ones, but what is perhaps more unexpected is that the deep pigs turn out to be also the long ones. The authors add that it is in view of the applicability of these results to pig breeding in general and the possibility of further useful information being obtained in the way that we think the Swedish type testing station results are so interesting.

References are also made to the pig testing stations of East Prussia and Hanover in Germany, at which valuable work is being carried on. In Canada and also in the United States of America numerous experiments have been carried out and much valuable data recorded; these experiments are of an intensely practical nature, and include the "Ton Litter" scheme, through which so much has been done to popularise pig production. That the Ton Litter Contests have done good by attracting attention to the need for some more accurate measure of pig production cannot be denied. Space is given in the report to the judging and recording of utility points, to carcass and bacon competitions, to pig recording schemes in Great Britain, to a criticism of present methods in re type testing stations, and pig breeding societies. References are made in the conclusions formed to (*a*) Government grading of pigs, (*b*) pig recording societies, (*c*) type testing stations, and of (*d*) proposed schemes for the extension of operations in England. Finally an outline is given of "How to start and develop the scheme."

"Pig Testing and Recording" is a most informative and useful record which we recommend to the consideration of every pig producer. Copies may be obtained from the National Pig Breeders' Association, 92 Gower street, London W.C.1.

THE 1927-28 "PIG BREEDERS' ANNUAL."

The seventh volume of the "Pig Breeders' Annual and Year-book," recently to hand, and published by the National Pig Breeders' Association of England, to whose courteous secretary (Mr. Alex. Hobson) we are indebted for copies, is one of the most up-to-date publications of its nature we have yet received. The "Annual" is in itself quite an attractive and up-to-date publication, profusely illustrated, covering 180 odd pages, packed full of interesting and informative matter of value to the up-to-date farmer in his every-day round of duties.

A feature of the volume is its information on many of the leading studs of the old world and of people interested in the preparation of meals, measures, and medicants, such as have been found to be of value in encouraging more rapid growth and earlier maturity in the several grades of pigs for which they are prepared.

Sir Daniel Hall, K.C.B., LL.D., D.Sc., F.R.S., in a thoughtful and informative foreword refers to the importance of "type" in the production of various grades of stud stock.

"The criticism," he says, "is often made that we have too many breeds of pigs in Great Britain." In this way he sets up a useful argument which, while favouring the bacon type as far as market pigs are concerned, does not necessarily condemn any particular breed or cross. It is certainly true that to be successful in marketing pig products in any part of the world, market requirements in the way of type, quality, and quantity must be kept strictly in view.

Professor Basil Buxton, M.A., F.R.C.V.S., contributes a useful and well-written article on "Some Parasitic Diseases of Pigs," which every farmer would do well to carefully study.

Major E. R. Orme, Marketing Investigator for the Ministry for Agriculture and Fisheries, selects for his theme "The Need for Organisation in the Pig Industry," and draws a useful comparison between past failures and future prospects in this most important branch of husbandry. His comparisons between the Danish and English conditions are very instructive, and his conclusions are based on a wide knowledge of the subject gained, we are sure, from a field much wider than those to which he makes reference in his report.

Agricultural Shows is the subject chosen by Mr. W. F. S. Hodgson, his discussion being along the lines as to whether they can be improved from the pig exhibitors' standpoint.

Messrs. John Golding, D.S.O., F.S.C., and W. B. Morris, B.Sc., devote their space to a discussion on "Some Experiences in the Course of Pig Feeding—Experiments at the National Institute for Research in Dairying," experiments by the way that have led to numerous important suggestions being brought forward for the benefit of readers generally.

"The British Pig Producer V.—The Dane" is the subject on which Wm. Todd, M.A., has some interesting conclusions to discuss. His arguments are sound and well worth careful study.

In a very thoughtful and detailed report Messrs. H. R. Davidson, M.A., Dip. Agric. of the School of Agriculture, Cambridge, and A. D. Buchanan Smith, M.A., M.Sc., of the Animal Breeding Research Department, University of Edinburgh, discuss "Pig Testing and Recording for the Purposes of Advanced Registry."

These authorities are so well and favourably known, and their writings are appreciated by such a wide circle of readers, that their opinions on this most important subject will form a topic for conversation and be appreciated by readers in every part of the world.

"The Potentialities of the English Co-operative Bacon Factory Movement" are discussed in detail by Mr. F. J. Suhr.

The reference to the "Standardisation of the Pig" is especially worthy of note. On the production side of the business, and dealing more particularly with English conditions, Captain Godfrey Phillimore, M.A., suggests ways and means "How to avoid a loss with Harley meal at £12 a ton and bacon at 13s. 6d. a score." To Australian pig farmers this article is a revelation, and will be perused and discussed with more than an ordinary share of interest.

"Judging Pigs in South America," by Mr. W. V. Judd, will be read with interest, as also will the detailed discussion by Mr. John Hammond, M.A., on "Growth and Conformation in the Pig." Mr. Hammond is associated with the Animal Nutrition Institute of the School of Agriculture, Cambridge, and is a well-known authority.

"Pig Production in Norway," by Mr. O. C. Hersoug, with its informative illustrations and useful comparisons, throws light on the successful attempt of the Norwegian people to make pig farming a profitable venture there.

Referred to as one of the greatest living authorities on all questions pertaining to costings, accounts, &c., Dr. Arthur G. Ruston, D.Sc., of the Leeds University, discusses at length and in complete detail "The Economic Value of Pigs on the Farm," an article worth a special place in the library of every farm whether he be specially interested in pigs or otherwise.

"The Development of the British Pig Industry," to which Mr. Jas. H. Stansfield makes extended reference, is of special interest in that it draws attention to the immensity and importance of pig raising, not only in the British Isles but in other parts of the world. The fact that Great Britain spends annually £60,000,000 sterling on the purchase of pig products indicates that Mr. Stansfield has a very large subject on which to work.

"Railway Rates for the Carriage of Pigs," by W. Hallas, a well-known authority on these matters, gives a great deal of useful information condensed into a very small space that has special reference to conditions in the old world more than to countries overseas. Nevertheless, the article is not without interest even in overseas dominions where also pigs are carried by rail over many thousands of miles.

"Pig Breeding in Australia," by Mr. E. J. Shelton, H.D.A., Instructor in Pig Raising to the Department of Agriculture and Stock in Queensland, will be read with special interest by a wide circle of readers. The article discusses the development of this industry under Australian conditions, and the possibilities of export of pig products to markets outside her own borders, as well as to an extension of local markets throughout the Commonwealth. Mr. Shelton is well known throughout Australia as an authority on this subject, and invites correspondence from interested readers in any part of the world.

"Wye College Pig Husbandry Research Centre," as discussed by Mr. V. C. Fishwick, P.A.S.I., N.D.A., N.D.D., describes the operation and experiments carried out at this important centre of activity, and is of interest.

"The Breeding of Commercial Pigs" on a mixed farm by P. Webster Cory, and "Pig Breeding of Yesterday and To-day" by Mr. C. L. Coxon, are both articles from the pen of practical husbandmen which will be read with interest.

"The Advantages and Simplicity of Weekly Weighings," by Captain C. L. Stiff, is especially worth careful note, for only by detailed attention to this most important part of the business can the farmer hope to secure the maximum reword for this industry. The very fact that the job is such a simple yet such an important one will appeal and open fresh avenues of thought in the minds of many pig farmers.

"The Pig Breeders' Annual" is recommended to every pig producer. Published at 92 Gower street, London W.C. 1, copies may be obtained through booksellers or direct from the secretary.

Photo.: Dr. L. St. V. Welch.]

PLATE 144.—CITRUS FRUIT IN THE WEST.

A prolific Lisbon lemon-tree in the Station garden on "Retreat," the property of Messrs. Button Bros., near Jundah.

"MUST HAVE THE JOURNAL."

Writing from Rose Hill, a farmer subscriber says: "I enclose postal note for 3s. for which please send me the 'Queensland Agricultural Journal' for a further three years.

"A farmer requires to keep in touch with all the latest scientific methods, and to do this he must have the Journal."

Answers to Correspondents.

Destruction of Weeds in Banana Gardens.

P. C. (Mount Pelion)—The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

Dissolve 4 lb. of grey arsenic with the aid of 2 lb. of caustic soda in a kerosene tin in a few gallons of water and make up to 100 gallons for spraying The mixture will only kill succulent weeds.

Bone Crushing.

H.N.R. (Woombye)—Your inquiry regarding the crushing of bones without a mill was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—

(*a*) Pack bones layer by layer, with fresh wood ashes, in a barrel, and keep moist with water for several months.

(*b*) Boil bones in copper or iron boiler with caustic lye for two to three hours; 15 parts of bones, 5 parts of caustic soda dissolved in 15 parts of water. Bones can also be left to stand in lye liquor for a few weeks.

(*c*) Mix bones in heaps with quicklime. Make a layer of loamy soil 4 inches deep, followed by a layer of bones 6 inches deep, and covered with a layer of quicklime (not slaked lime) 3 inches deep. Then layers of loam, bones, and quicklime until convenient height is reached and the whole is covered by a thick layer of soil. Holes are bored in this top layer of earth and water poured in, and the whole left for three or four months.

BOTANY.

The following replies have been selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

Tea Trees.

INQUIRER (Brisbane)—

Neither specimen sent represents *Melaleuca Irbyana*. It is rather a difficult matter to name Tea Trees from leaves only, but we should say that the big tree is *Malaleuca bracteata* (the River Tea Tree) and the shrub, *Bæckea virgata*.

Plants from Yarraman Identified.

INQUIRER (Brisbane)—The specimens from Yarraman have been determined as follows:—

M.A.R.

108. *Exocarpus latifolius*. Broad-leaved Cherry.

109. *Solanum discolor*. Devil's Needles.

110. *Dendrobium teretifolium*. Pencil Orchid.

111. *Dendrobium gracilicaule*.

112. *Brachychiton populneum*. (Syn. *Sterculia diversifolia*)—Kurrajong.

113. *Dodonæa cuneata*. A "Hop Bush."

114. *Cupania Xylocarpa*. A "Foam Bark."

115. *Duboisia Leichhardtii*. An interesting species intermediate between the Pituri (*D. Hopwoodii*) and Corkwood (*D. myoporoides*).

116. *Turræa pubescens*.

117. *Cleistanthus Cunninghamii*.

118. *Tarrietia Argyrodendron*. Booyong.

119. *Nephelium tomentosum*.

120. *Canthium vacciniifolium*.

121. *Marlea vitiensis*.

122. *Cupania anacardioides* var. *parvifolia*. Sometimes called "Tamaran," but I do not know the origin of the vernacular; perhaps it is a corruption of "Tamarind."

Yellow Pea *(Cassia notabilis)*.

INQUIRER (Brisbane)—

The specimen is *Cassia notabilis*, a species of "Yellow Pea" or "Wild Senna." It is apparently not very common in Queensland, as we have only previously received one specimen, collected many years ago by E. J. Whelan on sand ridges near the Georgina River. Its properties are not known, but the genus is widely spread over the warmer regions of the world, and a number occur in Queensland, some of them bad weeds. Most are more or less purgative, and "senna leaves" of commerce are the product of several species.

Dogwood—Snake Weed—Rush Lily—Bitter Bark.

G.P. (Rockhampton)—Your specimens have been determined as follows:—

No. 1. *Jacksonia scoparia*. Dogwood.

No. 2. *Stachytarpheta dichotoma*. Snake Weed. A malformed specimen of a plant very common as a weed about Rockhampton. The malformation is probably due to insect attack.

No. 3. *Xerotes multiflora*. Rush Lily. Rather an anomalous member of the lily family (Liliaceæ).

No. 4. *Alstonia constricta* var. *mollis*. Commonly known as Native Cinchona, Quinine, or Bitter Bark; see leaflet enclosed herewith dealing with the plant.

The Tea Plant.

H.H. (Brisbane)—

The specimen forwarded from Barrine, North Queensland, is *Camellia Thea*, the tea plant. An odd bush or so of commercial tea is to be seen growing here and there in Queensland. There are, however, a good many cultivated varieties, and what the particular one sent is we cannot say. We have not tasted tea from Queensland-grown bushes.

Sida corrugata—"Bindey-eye"—Cochineal Infested Pear.

J.R.B. (Roma)—The specimens were very much eaten, but seemed to represent only two species:—

Sida corrugata, a common weed of the mallow family, eaten freely by stock, and quite wholesome; and

Bassia quinquecuspis, a species of "bindey-eye," rather indigestible, but otherwise harmless.

Cochineal infested pear is not known at present to be poisonous.

SHEEP AND WOOL.

Selected from the outgoing mail of the Assistant Instructor in Sheep and Wool, Mr. J. Carew:—

Sheep Fattening.

G.A.P. (Sandgate)—

For grazing purposes the most suitable crop to grow for fattening purposes generally is lucerne, as it gives a longer grazing period than any other crop, but is rather particular regarding soil. The decomposed granite soil is not well adapted for its growth as compared with heavier loams. Rape and mustard make an excellent fattening crop for sheep, but is only suitable for winter and spring feeding, this with panicum (white) or sudan grass for summer and autumn grazing should be very successful. Wheat and field peas, oats, and barley are also useful. An addition of a few ounces of whole maize per sheep per day with any of the above will be found very beneficial. Giving those sheep to be fattened free access to the crops is the most economic method of fattening. Mr. Brünnich's pamphlet on Stock Foods forwarded.

PIG RAISING.

Selected from the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—

Castration Risks.

E.A.H. (Gulugubа)—

The death of the young pig was probably due to complications resultant upon castration; blood poisoning was apparent by the immediate cause, this possibly being due to the use of an unclean knife or to the open wounds becoming infected from the soil in the yard. Deaths of young pigs following castration are also sometimes due to loss of blood, weaking the animal to such an extent that recovery is impossible. Then again, sometimes through the pig being very ill and indisposed to move about and the bowels becoming clogged. It is not, of course, impossible for a castrated pig to become infected with the bacillus of Tetanus. If the bacillus of this disease found entrance through the open wounds, death would probably rapidly ensue.

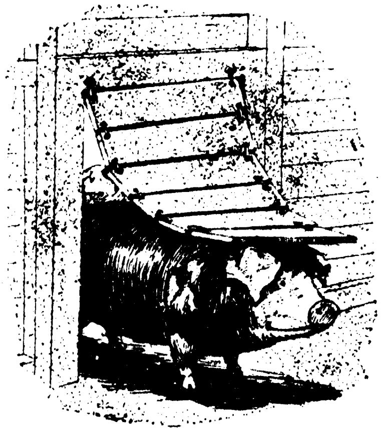
Paralysis in Pigs.

F.W.R. (Kingaroy)—

Tick paralysis in young pigs may be caused by the young pigs becoming infested with bush ticks. Of course, young pigs that suffer from severe diarrhœa or white scour are often very stiff and practically paralysed as a result of weakness of the hindquarter. Where pigs (particularly young pigs) are suffering from constipation, there will also often show indications of paralysis. Young pigs also sometimes suffer from a form of rickets and from heat apoplexy, of which partial paralysis are characteristic symptoms; the former, the result of lack of mineral matters and vitamines in the food, the latter the result of exposure. It is very difficult to definitely diagnose without inspection. Provide ample drinking water and green food, also charcoal, wood ashes, lime water, bonemeal, &c., as all these are valuable yet inexpensive additions to the pig's diet.

SECTIONAL SWINGING DOOR.

A sectional hanging door for the pig sty, as shown in the drawing, will keep fowls out but will not hinder the pigs. Cut a 6-inch board in lengths equal to the width of the door. Two holes are drilled in the ends of each board so that they can be wired together and the assembly hung in the doorway as shown.—"Popular Mechanics."



General Notes.

Hail Insurance.

The Regulations providing for the Hail Insurance Scheme under the Wheat Pool Acts have been amended.

Staff Changes and Appointments.

The appointment of Mr. E. J. Lorraine as Inspector under the Diseases in Plants Acts, Brisbane, has been confirmed as from 4th March, 1927.

Mr. W. A. R. Cowdry, Cadet Grader, Cotton Section, has been appointed Assistant Cotton Grader (Junior), Department of Agriculture and Stock.

Constable D. Dwyer, South Kolan, has been appointed Inspector of Slaughter-houses.

The following have been appointed Officers under and for the purposes of the Animals and Birds Acts:—Mr. M. Harland, Upper Cedar Creek, via Samford; Mr. C. F. Driver, Brisbane; Mr. N. James, Upper Cedar Creek, via Samford; Miss E. E. Bowton and Mr. F. K. Bowton, Inveragh, North Coast Line; and Mr. M. E. Joyce, Townsville.

The resignation of Mr. Jas. Hutton as Member of the Egg Board has been accepted as from 30th September, 1927.

It has been approved that Mr. L. P. Doyle, Inspector of Stock, Cooyar, be transferred to Cloncurry, and that Mr. D. Culhane, Inspector of Stock, Ravensbourne, be transferred to Cooyar.

Mr. J. C. Pryde has been appointed Temporary Inspector of Slaughter-houses, Toowoomba, as from 5th October to 16th November, 1927.

Constable R. Hamill, of Stanthorpe, has been appointed Inspector of Slaughter-houses.

Mr. J. D. Irving has been appointed Cane Growers' Representative on the Tully Local Sugar Cane Prices Board, vice Mr. F. H. Gilmore, resigned.

The appointment of Officer in Charge, Police, Evergreen, as Acting Inspector of Stock, has been cancelled, and the Officer in Charge, Police, Peranga, has been appointed Acting Inspector of Stock.

Egg Board Election.

Mr. A. H. Jones, Returning Officer, Department of Agriculture, advises that nominations will be received by him for the Egg Board Election, care Department of Agriculture and Stock, Brisbane, until the 24th November, 1927, for election for one year from the 1st January, 1928, as Growers' Representatives on the Egg Board Five such representatives are to be elected by growers as defined in the Order in Council of the 14th January, 1926, appearing in the "Government Gazette" of the 16th January, 1926. Each nomination is to be signed by at least ten growers of eggs.

The following districts shall return one representative:—

No. 1 District.—The Petty Sessions Districts of Bundaberg, Gin Gin, Mount Perry, Eidsvold, Childers, Maryborough, Biggenden, Gayndah, Tinana, Gympie, Kilkivan, Wienholt, Nanango, Maroochy, Caboolture, Woodford, and Kilcoy.

No. 2 District.—The Petty Sessions Districts of Redcliffe, and that portion of Brisbane north of the Brisbane River.

No. 3 District.—The Petty Sessions Districts of Wynnum, Cleveland, and that portion of Brisbane south of the Brisbane River.

No. 4 District.—The Petty Sessions Districts of Logan, Southport, Nerang, Beaudesert, Goodna, Ipswich, Lowood, Esk, Marburg, Harrisville, Dugandan, Rosewood, Laidley, Gatton, and Helidon.

No. 5 District.—The Petty Sessions Districts of Toowoomba, Clifton, Pittsworth, Allora, Warwick, Killarney, Inglewood, Texas, Goondiwindi, Stanthorpe, Highfields, Crow's Nest, Oakey, Goombungee, Cooyar, Jondaryan, Cecil Plains, and Dalby.

To ensure their names being on the roll, persons owning fifty or more domesticated fowls are invited to send their names for inclusion on the roll of persons eligible to vote.

The election, if any, will be held on the Thirty-first day of December, 1927.

North Queensland a White Man's Land.

Thus a Victorian settler on the Atherton Tableland, writing to a friend in his home State:—"The climate here is a revelation to me. There is nothing better in the world. The altitude makes it an ideal white man's country. . . . I have a grand lot of men working for me; never had better. They are long, loose fellows, splendid workers; a fine crowd personally, and easy to handle. They are nearly all Australian-born. I fear that in Victoria we look at Queensland with a lot of political bias."

More Sanctuaries Proclaimed.

The following properties, &c., have been declared sanctuaries for animals and birds:—

(1) Timber Reserve (R. 6), and portion 47, parish of Eungella (property of D. A. Parker), on the western fall of the Eungella Range, Mackay.

(2) Reserve for Scenic Purposes, No. 85, Cania Gorge, Gayndah.

(3) Grounds of St. Faith's School, Yeppoon.

(4) Properties of Dr. A. J. Marks, Mr. M. Harland, Messrs. C. F. Driver, N. James, and Mrs. E. R. Prentice, and Miss M. A. Burley, Upper Cedar Creek, viâ Samford.

Central Sugar Cane Prices Board.

The following nominations have been received for the position of Canegrowers' Representative on the Central Sugar Cane Prices Board:—

P. J. Hoey,
G. H. D. Plant,
T. A. Powell.

A poll will take place on the 12th November. The sitting member is Mr. Powell, and the person elected will hold office for three years.

Crate Packing of Bananas—A Correction.

Mr. William Leslie, Assistant Instructor in Fruit Culture, writes:—

Reference Note on Crate Packing of Bananas as in the October Journal—Under Plate 97 the descriptive matter reads in the third and fourth line—

"Four head-pieces $\frac{5}{8}$ in. x $\frac{22}{27}$ in. x $2\frac{1}{2}$ in.
Four head-pieces $\frac{5}{8}$ in. x $\frac{12}{17}$ in. x $2\frac{1}{2}$ in.,"

and under Plate 98—

"Eight head-pieces $\frac{5}{8}$ in. x $\frac{12}{17}$ in. x $2\frac{1}{2}$ in."

In the double case (Plate 97) the head-pieces should be from 22 to 27 inches and from 12 to 17 inches long respectively, and your copy reads as if these numbers meant fractions of an inch. Likewise in the single case (Plate 98) the head-pieces should be from 12 to 17 inches in length according to the dimensions of the bunch to be packed.

Queensland Butter at Islington—Warwick Wins.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that he was highly pleased to read of the further success of a Queensland factory at the important Dairy Show at Islington, London. The competition was open to the whole of the Dominions, and exhibits were staged from New South Wales, Victoria, Queensland, South Australia, New Zealand, Canada, and South Africa. In all there were eighty-three entries in the class, won by Queensland. The Minister desired to congratulate the management of the Warwick Butter and Dairying Association on their success in gaining first prize honours in such a strong competition. The result provides further evidence, if such were necessary, of the high quality of Queensland butter, and to secure 97 out of a possible 100 points, indicates that in the opinion of the judge the manufacture and quality of the butter were almost perfection. These butters would be judged after a lapse of about two months from the time of the actual churning of the cream, and the points awarded testify to the splendid keeping quality of the butter.

The Minister mentioned that the Warwick Butter and Dairying Association recently re-erected their factory on modern lines, fitted with the latest and most up-to-date machinery, and its success shows the material advantages that accrue through the installation of appliances of the latest design in factory equipment.

Bird and Animal Sanctuaries.

The following have been declared sanctuaries under and for the purposes of the Animals and Birds Acts:—Curtis Island, north of Gladstone; Pasturage Reserve (R. 129), Townsville.

Rural Schools—Training Brains and Hands.

This is what a Southern paper, "The Farmer and Settler," had to say of the exhibit of the Queensland Rural Schools at the last Brisbane Show:—

"Visitors to the Queensland show could not help being impressed with the value of the teaching given at the rural schools. Twelve of these schools are now established in Queensland—at Beenleigh, Boonah, Clifton, Gayndah, Gordonvale, Home Hill, Imbil, Malanda, Marburg, Murgon, Nambour, and Stanthorpe—and, though expensive to equip, judging by the high standard of excellence of the work displayed this year, they are well worth the cost. The rural school is going to help the bush boy and girl to a new interest in life, to love the life on the land, and to use their hands and their brains to the fullest extent and for the best purposes. Specimens of work in metal, leather, wood, and chemistry—soil fertilisers, and so on—from the boys, and in cookery, dressmaking, and, indeed, all branches of domestic science from the girls formed one of the best collections at the show. A saddle, a model portable piggery, stockyard—gates and all complete—watering cans and every household utensil in tinware, ploughshares and chains, bookcases and chairs, even a bed, all the work of country boys. The same degree of good workmanship was shown in the girls' section, and a remarkably clever exhibit in the cookery section was a wedding cake that had been made by one of the country girls. Nearby were dishes of sweets, cheese straws, cakes, pickles, and jams. Dressmaking and needlework were of the highest standard, and in consequence it may be safely considered that bush girls are being taught at our rural schools along the right lines to be the mothers of Australia of to-morrow."

4QG and the Farmer.

A commendable feature of the services provided by 4QG is the consideration given to people resident outside the metropolis. Too often city dwellers are prone to forget that outside the city environs there are thousands of men and women engaged in agricultural pursuits upon which the prosperity of our State largely depends.

Isolation from the big centres of population is a severe handicap to those who reside in the great open spaces, and no effort should be spared to make their conditions as bright and comfortable as possible. Now and again a listener-in writes 4QG complaining about the time taken up in the broadcasting of market and weather reports, news items, and agricultural lecturettes, but, fortunately, the big majority of city listeners realise the importance of such services to the man on the land.

The policy of 4QG is to cater for all sections of the community. City folk must not forget that whilst they are (in most cases, at any rate) in receipt of an assured income, the income of the man on the land is governed by the rise and fall of markets, weather, &c.

It is for these reasons that 4QG employs a specially qualified officer, Mr. Robt. Wight ("Market Reports"), to attend agricultural sales, collect market data, arrange agricultural lecturettes, and generally, look after the welfare of the country listener.

Fur Farming in Canada.

Even in the early days of the fur trade in Canada it was the practice for trappers to keep foxes caught in warm weather alive until the fur was prime; from this practice has arisen the modern industry of fur farming. The industry is devoted chiefly to the raising of the silver fox, a colour phase of the common red fox established through experiments in breeding carried on by the pioneer fox farmers. There are now in Canada 2,130 fox farms with a total of 42,125 silver foxes, 1,736 patch or cross foxes, 1,196 red foxes, and 735 blue foxes. There are also 210 farms raising fur-bearing animals other than foxes, chief among which are mink, racoon, skunk, and muskrat. The value of fur-bearing animals on farms in 1925 was 9,898,019 dollars, the value of those sold off in that year being 2,897,270 dollars. In addition, the value of pelts sold from fur farms in 1925 was 781,383 dollars, this representing about 4 per cent. of the total value of the fur production of Canada in that year. The exports of furs from Canada in 1926 were valued at 17,017,597 dollars.

Cheese Board.

The Order in Council constituting the Cheese Board and published in the "Government Gazette" of the 16th July, 1927, has been amended by the insertion of a further paragraph, providing that all moneys due by factories for equalisation purposes shall be paid to the Cheese Board by agents of such factories.

Amended Cheese Selling Rule.

Rule No. 10 of the Cheese Selling Rules, published in the "Government Gazette" of the 19th February, 1927, has been amended. The Rule now provides for the maximum commission payable to agents for the sale of cheese, not to exceed 5 per cent. The maximum previously was 4½ per cent.

Northern Pig Board.

Nominations will be received by the Returning Officer, Northern Pig Board, care of the Department of Agriculture and Stock, Brisbane, until 5 p.m. on 21st November, 1927, for election for one year as growers' representatives on the Northern Pig Board.

Five such representatives are to be elected by those persons, who, at any time since the twenty-second day of June, 1927, kept pigs in any of the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan.

Each nomination is to be signed by at least ten such growers.

If more than five nominations are received, a postal ballot will be taken.

The election (if any) will be held on the 23rd December, 1927.

Milk as a Food.

Milk is as near a perfect food as it is possible to obtain, as it contains all the essential elements for normal growth and development. We find it contains the materials necessary to maintain the living tissues of the body, i.e., proteins, and enough of the fats, starches, sugars, and mineral substances to furnish energy and growth. Milk contains a substance whose nature is not yet fully understood, but whose presence in the diet has been demonstrated to affect body growth in animal or man to a remarkable degree. These substances are termed vitamines, growth determinants, or the unknown dietary factors.

Clean milk fulfils all of the requirements for an adequate food better than any other single foodstuff, and it is the food most needed on the plantation, and in a great many instances, the hardest to obtain. Infant mortality would be decreased, and a healthier lot of youth would result were more pure, fresh milk used as food, and not considered in the light of a somewhat rare beverage for the older children. Milk as a source of energy, or as fuel for the body, compares most favourably with other foods.

The energy value of a quart of milk is about equivalent to that of a pound of lean meat or of eight eggs. As a source of energy, "cereals"—such as wheat, oats, or barley preparations—are, however, cheaper generally than either milk, meat, or eggs, and therefore cereal and milk is the ideal combination of foods to furnish energy in childhood.

Of all foodstuffs, milk is the cheapest, and most abundant source of obtaining the essentials for bone formation and growth. Therefore, milk should form a large part of every child's diet. How often have we seen ignorant mothers bringing up infants on a diet of coffee or tea, to which was added a small amount of canned milk!

WOULD NOT BE WITHOUT THE JOURNAL.

Thus a Bororen correspondent: ". . . The Journal is a publication I would not be without."

Swat That Fly.

The Dairyman's Pest.—Go into a milking shed on a very hot day in which cows are bailed up for milking, and notice the large number of flies annoying each animal, and see how that animal switches its tail, moves its feet and body in order to "keep the fly moving." If you want contentment and milk something should be done to rid the cows of the fly pest.

Flies are a terrible torment at times and have much to do with the lessening of the milk-flow. The cows are so worried and kept so busy fighting the flies that they lose much of the time they should be feeding, and it is their semi-starved condition that largely causes the shrinkage in flesh and milk.

The following mixture has been found as effective as, and less expensive than, many of the fly remedies on the market:—1 gallon fish or seal oil or old grease of any kind; 1 pint kerosene; 2 ounces (4 tablespoonfuls) crude carbolic acid. Mix well together and apply with a cloth or spray to all parts except the udder. Always put it on after milking to avoid the strong odour getting into the milk. In dry weather one application a week is usually sufficient. If the cows are out in a heavy rain, it will be necessary to go over them again.

Another fly remedy is:—10 parts of lard, or other grease, to 1 pint of pine tar. Mix well and apply with a brush or cloth once or twice a week to the parts most attacked. This is splendid as a relief.

The House Fly.—The house fly has always been a troublesome nuisance, but it is looked upon as a very potent agent in spreading dangerous diseases.

Flies are such indiscriminating scavengers; in their migrations they visit everything both hidden and revealed. When we consider this, the thought of them walking over our food or taking a sail in the milk pitcher is far from pleasant, and when bacteriologists inform us the average fly carries around on its body one and a-quarter million germs, surely we should feel a just cause for alarm.

How they Breed.—Flies breed profusely in filth. They reproduce themselves in counless thousands in the open manure pile, in the dirty pig pen or yard, in places where the household slops are regularly deposited, in vegetable garbage, any place where there is decomposing material.

By storing the manure in a dark shed, or by spreading it on the fields, keeping cow and calf yards and pig yards, &c., as clean as possible, and by providing better sanitary conditions, the troublesome fly can be greatly reduced.

To sprinkle all possible breeding places with kerosene or cover with lime, every few days, is strongly recommended.

Dr. Howard, entomologist of the United States Department of Agriculture, has found that each female lays about 120 eggs, which hatch in eight hours, the larva period lasting five days and the pupa five days, making the total time needed for the development of a generation just ten days. A big fly has always been a big fly, and a little fly can never grow to be a big fly—and just as soon as they have emerged from the pupa stage they begin laying eggs. Under favourable conditions a single pair of flies are capable of breeding something like 74,473,197,060,800,000,000,000 of their kind in a single season. Thanks to the birds and other agencies, flies are kept somewhat in check.

Our Deadly Enemy.—It is almost impossible to keep flies out of the kitchen, milk-room, and cow-stable, but we can greatly lessen their entrance by having the windows and doors screened.

Do not feed the flies by leaving dirty dishes and cans about the premises. Wash the milk-room floor clean.

We must learn to regard them as one of our most deadly enemies.

Electric Lighting on the Farm.

Mr. Walter Tronson, a well-known Pomona dairy farmer, in the course of a very interesting letter to the "Live Stock Bulletin" (1st October), had this to say:—"By the way, I often wonder why more dairymen who run milking machines, and have engines, do not get a dynamo, so that they can have their houses lit with electric light. I have been lighting my place for years, and it never gives any trouble. I was speaking to the manager of a big electric light works the other day, and he said to me that any dairy farmer who had an engine could get a dynamo, all the wiring for seven or eight points, a suitable battery, everything complete, for £50. Why the dickens doesn't every dairyman light his house properly?"

New Zealand to Can Butter.

According to the "Times" Trade and Engineering Supplement (London), a report from its correspondent at Vancouver states that "the unfortunate experience of New Zealand in regard to her price-controlled butter on the London market has apparently led exporting interests in the Dominion to make preparations for canning butter on a larger scale for the world's markets, and orders have just been placed with a company for 1,000,000 cans from the 1 lb. to 20 lb. capacity.

"These cans are to have three different designs, and hues to meet the different colour requirements in South America, the Orient, and the South Sea Islands."

Essentials in Dairying.

There is always a definite starting point in attempting to achieve all things, and in reducing the cost of producing milk and its products the very first move must be that of taking an inventory of the whole situation as it now exists. That is the one way to find out what is wrong, and nothing can be righted until you know wherein it is now wrong.

Here are three fundamental facts (says the "Live Stock Journal") that must be grasped before the situation can be appreciated in the proper light:—

1. The dairy cow is a machine.
2. The dairy farm is a factory.
3. The dairy farmer is a manufacturer.

He who doubts these statements and does not conduct his operations accordingly will fail in ninety-nine cases out of a hundred. His only hope is that of luck.

On the other hand, when one who milks cows gets these three sentences marked indelibly on his mind and implanted in his heart, so that he recognises them as essential, vital facts, he soon realises that there is no business more worthy than dairy farming, no factory where good management is more necesasry than on the farm, and no machine more responsive in converting raw material into finished commodities than are good dairy cows.

The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre on Monday, 26th September, 1927.

The President, Professor E. J. Goddard was in the chair.

Messrs. A. M. Epps and L. Franzen were elected ordinary members of the Society.

Dr. E. O. Marks exhibited waterworn pebbles of igneous rock from the Mesozoic sandstone at Caloundra. Dr. Bryan and Mr. F. Bennett commented on the exhibit.

A paper on "Plants collected in the Mandated Territory of New Guinea by C. E. Lane-Poole," by Messrs. C. T. White and W. D. Francis was communicated by Mr. C. T. White. He laid on the table Mr. Lane-Poole's report on the Forest Resources of the Territories of Papua and New Guinea, published by the Commonwealth Government in 1925, which contained the narrative of the expedition and field notes on the specimens collected. Four species were described as new: *Sarauja emarginata* (Dilleniaceæ), *Eurya albiflora* (Ternstroemaceæ), *Mearnsia cordata* (Myrtaceæ), and *Hoya Poolei* (Asclepiadaceæ); and a number of new records were made of the distribution of known species.

Mr. A. K. Denmead, B.Sc., read a paper entitled "A Survey of the Brisbane Schists." This was an account of his investigations of the basal rocks between Tweed Heads and Rockhampton. He divided the rock formations into four series: (1) The greenstone series, largely in evidence near Petrie and Dayboro'; (2) the Bunya series, of micaphyllites, found in the area between Tweed Heads and Beenleigh, also at Coorparoo; (3) the Neranleigh series of greywackes, slates, &c., between Nerang and Beenleigh, and (4) the Fernvale series of jaspers, limestones, serpentines, &c. The trend of the rocks generally, he said, was from north-north-east to south-south-east. He advanced theories as to earth foldings and faults, and suggested that, in point of age, the lower beds were Silurian, passing through the Silurian into Devonian, and possibly through the Devonian into the Carboniferous. The paper was discussed by Dr. Bryan (who also communicated Professor Richards' comments), Drs. Whitehouse and Marks, Messrs. Tryon, Massey, and Bennett.

Value of Orange Juice.

The great value of orange juice was pointed out in a paper read by Dr. Stanley Willmott at the British Pharmaceutical Conference, which recently sat at Brighton, England. "Of all citrus juices," he said "there is little doubt that that of the orange is the most valuable. It is, perhaps, the only food other than milk that can with safety be given to infants. New experiments have shown that orange juice has a much higher food value, or vitamin content, than was previously ever suspected." The chairman of the conference said the food value of oranges was remarkably high, and the use of pharmacists of the concentrated juice was a matter of importance.

Shade Trees—Their Economic Value.

The treeless farm presents a very sorry spectacle, and one cannot fail to feel pity for the animals that are obliged to stand or lie in the broiling sun because of the absence of shade of any description.

It should be the aim of every farmer to surround his homestead with trees and to establish moderate-sized clumps in all the paddocks. Awkward corners can be utilised in no more profitable and pleasing manner than by planting them with trees.

In districts where timber for fencing and other purposes is scarce, all land that offers any difficulty in carrying on cultural operations should be planted. The investment, provided that the trees are accorded reasonable care and not interfered with by stock, will in the years to come return a very high rate of interest.

Apart from their economic and utilitarian value, trees, when judiciously arranged, add immensely to the attractiveness of a property and render it pleasingly distinctive, so that strangers in the district are immediately impressed.

Dirty Fallows—Work for Summer.

Neglecting the fallow during the months of November and December is the chief cause of dirty fallows, and there is ample evidence that cultivations during those months have a more beneficial effect than in any other month of the fallow period. It is evident, too, that the more frequently the fallow is worked, provided of course it is done in the right manner, the better the chance of maximum yields. No better proof of the correctness of this statement is to be had than the results of the Central Western Championship Wheat Competition of last season, in which the winning crop—it obtained the highest points in all competitions in the State—was cultivated ten times between ploughing and sowing. Working the soil during the hot summer months is, of course, not recommended unless rain has destroyed the mulch, in which case it should be restored.

Perhaps the most frequent cause of harm to fallows is allowing weeds to grow to such a height that the disc-cultivator has to be employed, and to a depth ruinous to the compacted sub-surface soil. It is essential that all weeds should be destroyed when they are very small by shallow cultivation, preferably with the harrows.

The disc cultivator, regarded with such a friendly eye by most wheat-growers, is without doubt the best implement of all to put the fallow in bad condition. While admitting its value in destroying large weeds, it must be admitted that their destruction when small with other implements or sheep is nearly always possible, and that large weeds are the sign of neglected fallows. Deep discing ruins the compacted sub-surface layer, and delivers the clods to the bottom and fine soil to the surface, where it is easily crusted by the first rain. As discing usually takes place after harvest in January or February, not only is the whole physical condition of the fallows practically ruined, but rapid evaporation of moisture results, and there is not sufficient time to restore consolidation unless special means are devised, and they very rarely are.

It is in connection with the keeping down of weeds on the fallow that sheep are so valuable. They should undoubtedly be regarded as essential on every wheat farm; not only are they in themselves a profitable source of revenue, but they are a big factor in the production of an ideal fallow, not only by keeping down weed growth but also in assisting to produce a firm sub-surface area.

THE JOURNAL CONTAINS A WEALTH OF INFORMATION.

A Mulgeldie subscriber writes: "Enclosed please find renewal subscription for the Journal. Many thanks for past copies which have contained a wealth of information for the man on the land."

Production Costs in Terms of Time.

Interesting investigations were recently carried out by the Department of Agriculture, United States of America, with regard to the amount of labour expended in the production of various agricultural products which show that ordinarily tobacco requires more labour per acre than any other major crop grown in the United States. An acre of Burley tobacco yielding from 800 lb. to 1,000 lb. requires for growing, preparing for market, and marketing, from 350 to 400 hours of labour.

Cotton in the eastern cotton States requires from 100 to 125 hours of labour per acre where the yield of lint is from 150 lb. to 200 lb. On the other hand, in the western part of Texas, growers on farms yielding 140 lb. to 160 lb. of cotton per acre will normally expend only thirty-five to forty hours of labour per acre.

In producing an acre of potatoes from sixty-five to 100 hours of labour are normally used.

Labour requirements in corn production vary widely. In the Corn Belt, where large machines are used in large level fields, a bushel of corn can be produced with about 0.5 hour of labour, whereas in certain Southern States about 2.5 hours of labour are required for producing a bushel of corn.

Tobacco, cotton, sugar beets, potatoes, fruit, and truck crops absorb relatively large quantities of labour. Corn, the grain sorghums, and peanuts need less. Hay and small grain crops are usually produced with the least labour.

Agricultural Education in the United States.

According to "The Journal of the Ministry of Agriculture," London, agricultural education in the United States of America during the past thirteen years has made remarkable progress through the development of the extension movement. This development dates from the introduction of the Smith-Lever Act in 1914, the keynote of which is co-operation. Prior to this Act, colleges were conducting considerable extension work with their own funds, and the Federal Department of Agriculture was spending, independently of the colleges, a further sum of 1,000,000 dollars. This work is now carried out by a single division, organised at the college, with a director at its head, appointed by the college with the assent of the Secretary of Agriculture. There is, further, co-operation between colleges in part of the extension work and in the plan for the voluntary pooling of all funds available for the various States.

In 1914 the State and Federal Governments were spending 1,600,000 dollars on extension work in agriculture and home economics, and, by 1924, this figure had increased to 19,394,639 dollars per annum, of which approximately 12,000,000 dollars were contributed by the States and counties.

In the same period, the total personnel increased from 1,230 to 4,764 officers, the latter figure including 765 full-time specialists, extension directors, and other supervisory officers.

In determining the policy of the extension work for a district, the farmers, with the agents of the co-operating county, State and Federal Governments, together review the local conditions and agree upon what ought to be done. The administration of the work is then entrusted to the State College of Agriculture. The full recognition of local people, conditions and practices, and the enlistment of the active participation of the individual farmer and his family in the planning and the carrying out of local extension work, are the two fundamental considerations to which the success is accredited. Demonstration farms, owned and operated by the Government, are being replaced by demonstration units owned and operated by the farmers under schemes developed jointly by the farmers and the Government agents. This partnership of the farmer with the Government, together with his work as a voluntary helper in the capacity of demonstrator, chairman or member of committee, has developed a sense of rural leadership, and given to the farmer a greater breadth of outlook, apart from the more direct benefit which accrues from the opportunity of improving his technical efficiency. The primary object of extension work, however, is the adoption of an improved practice, and there is evidence of a much wider use by farmers of lime, cover crops, green manures, fertilisers, seed of improved and standardised varieties, and of the improvement of orchards by renovation, pruning, and spraying.

Farmers are advised as to the formation of co-operative organisations for the disposal of their products and for the purchasing of their supplies, provided with general information on marketing problems, encouraged to adopt better business principles, and stimulated to keep and utilise farm records as a means of regulating their business.

Concentrates—Price Not Always Index of Value.

In buying concentrates, it should be borne in mind that the market price of any particular feed is no indication of its value to the individual farmer. The value of any feed to the farmer depends largely on the nature and composition of the other feeds which he has at hand.—T. HAMILTON, in the "Rhodesia Agricultural Journal."

Co-operative Development in the United States.

It is estimated that in 1900 there were approximately 2,000 farmers' business organisations functioning in the United States. Between 1900 and 1925 the number of active associations increased to about 12,000, and the purposes for which associations existed also increased.

At the close of 1925 there were approximately 12,000 functioning associations, including 40 federations, 80 centralised associations, 35 sales agencies, 50 bargaining associations, and nearly 10,000 independent local associations.

The number of associations marketing dairy products increased from 1,600 to 2,200; the number of associations handling grain from 100 to 3,400; the number of livestock shipping associations from less than 100 to 1,800; fruit and vegetable marketing associations from 100 to 1,300. There were also formed nearly 100 associations for marketing wool, and 70 marketing poultry and poultry product.

It is reasonable to assume that the business done in 1900 amounted to less than 200,000,000 dollars. This figure is significant in comparison with 2,400,000,000 dollars which is the estimated amount of business by farmers' associations in 1925. The 1900 figure is even more significant in the light of the fact that several of the present-day associations report sales of more than 50,000,000 dollars a year.—"News Bulletin" of the Markets and Migration Department (Federal).

Seeking a Substitute for Petrol.

Speaking at the annual meeting of the Distillers' Company, Limited, in Edinburgh (Scotland) recently, the chairman (Mr. W. H. Ross), referring to the extension of the company's business overseas, said that it was conducting experiments in order to provide an alternative motor fuel. Although it had demonstrated beyond doubt the possibility of providing such a fuel, the company was met with two difficulties—(1) the improved position of petrol supply, which has enabled that commodity to be sold in England at a figure below the present cost of production of an alcohol fuel, and (2) the uncertainty of finding a raw material for producing such a fuel in England at a low enough price. In conjunction with international interests the company was now experimenting with a material that in time might supply the deficiency, but while continuing these experiments the company had also turned its attention to other parts of the Empire where the raw material could be obtained in considerable quantities at the minimum of cost. Such a field had been found in Northern Queensland, where, in conjunction with the local sugar planters and other Australian interests, and supported by the State Government as well as the Commonwealth Parliament, it had erected a moderately-sized distillery, which would be followed by others as soon as the first one had proved a success.

Mr. Ross acknowledged the valuable assistance the company had received at the hands of the Commonwealth and of the State Governments, which should go far to make this new industry a benefit both to Australia and to the company.

An Effective Mouse Poison.

A poison that is proving highly satisfactory to farmers pestered by mice and sparrows is made of wheat coated with strychnine and milk. About 12 lb. of wheat (seconds are quite suitable) is first moistened with milk, and any surplus milk then drained off. One ounce of strychnine is next ground up and dusted on to the moistened wheat, which is mixed up by hand, and finally spread out on a bag to dry.

This poison is very strong, and a mouse has only to eat one grain to be destroyed. Another advantage is that this poisoned wheat may be kept for two years without losing its effectiveness. As soon as any mice are noticed the poison should be spread around and the mice will quickly disappear.

If the majority of farmers would adopt these preventive methods, mouse plagues would be quite unknown. If all haystacks were made mouse-proof with galvanised iron, the breeding grounds would be removed, and this combined with the use of poisoned wheat would stop a mouse plague at its very inception.

Now that farmers in our wheat districts are becoming more progressive and better organised, local bodies such as agricultural societies or branches of the Agricultural Bureau, who take a pride in local improvement, might organise co-operative movements to free their districts from the menace of future mouse plagues.—E. S. CLAYTON, Senior Experimentalist, in "Agricultural Gazette," New South Wales.

Market Good Crops through Good Cows.

The aim of the dairyman should be to market a large portion of the crops grown on his farm through his cows, but it should be borne in mind that the kind of crops grown and the way they are fed has a lot to do with their ultimate value when marketed as dairy products. As far as possible the dairyman should avoid sending good crops to market through poor cows.—T. HAMILTON in the ''Rhodesia Agricultural Journal.''

An Appeal for Thrift.

The seasons and the prices are not alone to blame for the shortness of money and the failure to make the farm pay. Those who know most about the economic conditions are outspoken in their appeal to farmers to exercise thrift. The same appeal may with equal force be made to all classes. In facing the prospect farmers will have to look more closely into those expenditures which are not necessary and which carry so many others in their train. A short period of intense thrift would be healthy for us all and do the country great service. Such a lessening of expenditures as could easily be made would help many a man to tide over his season and market difficulties. The only alternative is a lengthened procession of failures and a longer period of losses alike to farmers and to traders.—Waimate ''Advertiser,'' (N.Z.).

Encourage Home Manufactures.

If an individual policy is adopted of purchasing goods locally made wherever a choice is possible, the result will be increased confidence on the part of manufacturers, extensions of buildings and plants, the establishment of new industries, and a much larger demand for skilled labour. These, in turn, will add to the man-power of the country, will enlarge our resources, and so make the burden of taxation proportionately lighter. In building up our own national strength we are making our greatest and most valuable contribution to Imperial strength and unity.—Lyttleton ''Times'' (N.Z.).

Land Values.

It would be the height of absurdity, realising the conditions that make farming unprofitable, to hesitate to adopt those measures which will give the industry a chance to make good. It is essential that confidence be restored, not only amongst farmers, but those who finance the farmers, and this can only be done by ruling definitely that land can have only one value, and that what it is capable of returning from production in average years. There can no longer be a taxing value, and a selling value from 150 to 200 per cent. above that on which taxation is paid. The settler must have his chance, and the system adopted must afford him not only protection against exploitation by speculators, but protection against any inclination on his own part to take serious risks.—''Southland News'' (N.Z.).

Do the Job Properly!

Competition from abroad will compel efficiency or drive inefficient industries out of existence. This was shown in a remarkable manner some years ago in the British boot industry, which plodded along in its old-fashioned way until American boots began to invade the British market. The British manufacturers did not, however, wait for a tariff to protect them; they overhauled their industry and made it so much more efficient that in a short time they were able to drive out the invaders and in their turn invade American territory. There are efficient industries which are prospering and not participating in the demand for higher protection, but there are others whose overhead expenses are so heavy that they cannot make a profit.—''Taranaki Herald'' (N.Z.).

Our Social Obligations.

''More and more we are realising that property can be justified only when it fulfils a function in society. The fortunate individual who draws huge royalties merely because he is lucky enough to own land which contains wealth; the middleman who produces nothing and who yet takes a big proportion of the profit; the man who lives on dividends and serves the community in no way to make up for the fact that he is not engaged in business: all of these ought to be taxed so heavily in comparison with the rest of the community that they will be tempted to serve a more useful purpose than merely to live upon the work of others.''—From ''The Permanent Value of the Ten Commandments,'' by H. J. Flowers, B.A., B.D.

Fodder Sorghum.

After-cultivation and Harvesting of the Crop.—In a recent issue of these notes attention was drawn to the value of the sweet (or fodder) sorghums, particularly to farmers in the drier parts of the State. Coastal dairy farmers have long ago realised the value of sorghum as supplying a highly nutritious and bulky fodder which is relished by all stock.

As particulars regarding sowing, manuring, and varieties were dealt with in the previous article, we will confine ourselves now to a consideration of after-cultivation and harvesting of the crop.

If the crop has been planted on the flat, the spaces between the rows should be lightly worked with a one-horse cultivator when the young plants are from 4 to 6 inches high. If the seed has been planted in furrows the first working of the ground should be carried out, when the young plants are 3 inches high, by lightly harrowing the area in the direction in which the drills run. This work kills a considerable amount of weed growth, and at the same time works some fine soil around the young plants. Another harrowing should be given when the plants reach the top of the drill, in order to finally level off the ground and check weed growth.

Frequent workings with the cultivator are necessary during the growth of the crop to keep down weeds and check evaporation of soil moisture. On large areas, a handy implement to use is a two-horse spring-tooth cultivator; this straddles the rows and covers a lot of ground in a day. This machine can be used until the crop is 3 or 4 feet in height; if subsequent workings are necessary, the single-horse machine has to be resorted to.

Shallow cultivation is necessary, as the sorghum roots come to within 3 or 4 inches of the surface of the ground.

When and How to Harvest.—Sorghum should not be fed to stock until it comes into head; if fed prior to this stage there is a danger of what is commonly known as sorghum poisoning. The greatest yield of green fodder is obtained when the seed has formed and is still in the milky stage; at this stage the material is very palatable and digestible.

Harvesting large areas for silage is generally carried out with a maize binder. This machine deals with a single row of crop at a time, and ties the material into bundles, thus facilitating handling in the field and at the silo chaff-cutter or silo stack. If the sorghum crop is not too high and bulky, and the stalks are fine, a reaper and binder will do effective work.

On small areas the crop is cut with sickles or hoes. A handy implement for cutting maize or sorghum stalks is a sledge with scythe blade attached; it is drawn by a single horse, and will cut a large amount of material in a day.

Sorghum intended for silage should be harvested when the grain is in the dough stage. Like all bulky fodders, it makes the best silage when chaffed, as it then packs well in the silo.

Sorghum Poisoning.—Cases of death have occurred frequently among cattle feeding upon sorghum. The deaths have been attributed by some to the presence of a poisonous substance in the plant, while others hold that they are caused by hoven, and that the crop is not more likely to cause death than any other green food. The suddenness of death, however, among stock after eating only small quantities of the plant is proof that some other factor than hoven is at work.

In feeding sorghum to stock it is only necessary to adopt certain precautions to avoid loss. The poisonous substance gradually diminishes as the plants get old, and entirely disappears by the time the seed is formed. Stock should not be allowed to eat young sorghum, especially if it is wilted through dry, hot weather. Stunted sorghum may also cause death, and immature sorghum which has been frosted is dangerous. The mature sorghum is harmless, and can be fed with perfect safety.—"A. and P. Notes," N.S.W. Dept. Agr.

PLEASED WITH THE JOURNAL.

A Warwick subscriber writes: "I received a copy of the 'Agricultural Journal,' also leaflets on poultry. I am very pleased with the valuable information on different subjects. I am enclosing order form for the Journal, which I consider no farmer should be without . . . ."

Beekeeping as a Farm Side Line.

Following are points of a paper on beekeeping on the farm read by a local farmer, Mr. A. J. Gregory, at a recent meeting of the Port Elliot branch of the South Australian Agricultural Bureau:—

Mr. A. J. Gregory said any farmer with a little knowledge of the subject could keep a few hives of bees without neglecting the more important work of the farm. To manage bees one required confidence, because the bees would detect nervousness, and drive the apiarist away every time he approached them. Bees should not be handled roughly, because that annoyed them. A smoker was the best thing to keep them in check. One should not go to the hive and puff smoke straight into the entrance; that had a tendency to drive the bees into the top part of the hive, and when the cover was removed one would find too many bees to drive down again, and they would become troublesome. The correct procedure was to go quietly to the hive, puff some smoke across the entrance once or twice, raise the cover sufficiently to puff some smoke across the top of the combs, put the cover down again for a few seconds, and then remove the cover. The smoke should be kept going across the top of the comb until the bees were all driven down, and then the combs should be removed for inspection. Those which were full of honey or contained sealed broods and honey should be extracted. On no account should unsealed ones be put through the extractor, or the hive of bees would be weakened, and if the honey flow continued would mean a loss, because hives which were not full of workers would not produce much honey. With regard to the position for standing hives, one should select a well-sheltered position, preferably facing an eastern slope. The hives should be placed at least 10 feet to 12 feet apart, with the entrance towards the east. They should not be placed too close to the homestead or a thoroughfare, or any part where other work had to be done, or trouble could be expected from the bees. Hives could be bought flat or intact, as well as frames, from any firm which stocked appliances. It was cheaper to buy the hives flat, so that they could be easily nailed together. Frames should be put together neatly, and fine wire used to hold the combs together. To fasten the foundation combs in the frames, one should cut a piece of board to fit inside the frame, place the foundation comb on the board, put the frame over that and press the wires into the comb, and fasten to the top of the frame with melted wax. In rearing queens, they should be selected from the best honey gatherers, and never from a poor gatherer. Drones also should not be reared in any but a hive of good gatherers. A few drone combs should be placed in the centre of the hive during the early spring. Speaking of methods of increase, the writer said if one had not time to watch the hives when swarming during spring time, the number of swarms could be increased by pasting them up, providing they were in double hives, and strong enough to make into fair swarms. One should remove the cover, and give the bees a thorough smoking, so that the queen and most of the bees were driven down to the lower part of the hive. The top part should then be removed and placed on a bottom board, a cover put on each, and the bottom part removed to another part of the apiary, leaving the top part in its original place. Both parts should be inspected after about five days in order to ascertain the swarm with the queen. If she had been left in the top part the places should be changed again, or most of the bees would return to the old position after a few days. After eight days the hives should be inspected in order to see which hive had no queen, and then all the queen cells except one should be removed. Only one queen cell should be left. If more than one was left the bees would swarm as soon as one queen was hatched. They should be allowed to swarm naturally and if one had the time it was best to hive them. In any case, if possible, they should not be permitted to send out more than one swarm each. The old hive should be examined five or six days after the swarm had left, and all the queen cells except one removed; otherwise they would have too many young queens ready to send off other swarms. That was the time to select queens from the best honey gatherers. The queen cell should be placed into a hive which was not producing good supplies of honey, and, at the same time, all the queen cells from the poor hives should be removed and destroyed. If the hives were not very strong, or there was not sufficient working bees available when good honey flowers were about or coming on, a good plan was to put a weaker hive alongside of them for a few days, and then move them to another part of the apiary. Similarly, if one had too many bees or too strong, they should be changed with a weaker one. That should only be done when good honey flower was in bloom. The writer concluded by saying that quality was more to be desired than quantity; thirty well-cared-for and well-worked hives of bees would gather as much honey, or perhaps more, than 100 hives in a weak state and badly managed.

Varieties for Cross-Pollination.

Varieties planted for cross-pollination must have an affinity for each other; that is, the pollen of one must be acceptable to the pistils of the other, and such as will give the heaviest yields of good fruit. Both must be good pollen producers. If one is a shy bearer, and the other blooms in abundance, the variety producing little pollen will, of course, be greatly benefited, but there will be little reciprocal action.—J. M. WARD, in the "Journal of Agriculture" of Victoria.

The Reserve Power of the Horse.

Horses have the advantage of being immediately adaptable to all conditions; they can be used on wet, soft, and boggy country, and then proceed along a macadamised road. The flexibility of the horse is marvellous, and in this he has a distinct advantage over the motor. For short distances the horse can develop a power several times as great as its normal working power. For this reason he can pull through clay bogs, climb steep hills, and successfully deal with all sorts of emergencies. On the farm the horse looks after its own repairs and renewals—the cost of which to the owner is infinitesimal.—J. F. MCEACHRAN, M.R.C.V.S., in "Agricultural Gazette," N.S.W.

The Constitution of the Dairy Cow.

To stand up to the strain of heavy dairy production a strong, robust constitution is one of the essentials needed. Much of the dairy cow's time in daylight when she might otherwise be feeding is taken up in and about the bails or yards and travelling backwards and forwards to the pastures, and as compared with fattening stock she is under a big disadvantage in this respect. Then, again, when in times of severe drought the feed is dried off by the great heat and practically disappears, the heavy-milking cow will, for a time, draw on her reserve forces to supply milk, to the certain detriment of her constitution.—J. T. COLE, at a recent Animal Husbandry Conference (N.S.W.).

Practical Co-operation.

Batlow (New South Wales) fruitgrowers commenced co-operative operations in 1923 by establishing cool stores with 8,000-case space capacity. In 1924 they increased their stores to 14,000 cases, and, in addition, formed a co-operative packing-house company, and provided and operated the most up-to-date and efficient packing conveniences and plant. In 1926 the success of the existing cool stores demanded increased accommodation, and the stores were again enlarged to provide 24,000-case space. Not satisfied with trebling their undertaking in the first four years of their operations, the society is at present engaged in duplicating their stores, and will have from 45,000 to 50,000-case space available to handle the 1928 apple and pear harvest. As the stores are filled twice in the normal year, Batlow will be able to store upwards of 100,000 cases next harvest.

The cool stores and packing-house have enabled the growers to exercise a control over their marketing, and in this connection their Sydney selling depôt and their direct country sales have been mutually beneficial to the producer and the consumer.

There are only thirty-six members of the cool stores and twenty-four of the packing-shed. The capital costs are: Cool stores, £14,000; packing-shed, £3,500, making a total capital outlay of £17,500, of which £11,705 has now been actually provided by the growers. Of this £11,705, calls on shares have provided £5,785, and retention and loan levies £5,920. To provide for the 1927-28 extension of the cool stores, this latter sum is being capitalised in the form of shares paid up to 5s., which are being issued to existing shareholders in proportion to their individual retention and loan levy credits. It is of interest to note that the loan levies—which in the case of the packing-house amount to 3d. per packed bushel case on all fruit handled for shareholders, and with the cool stores to 6d. per case space per annum—both charges representing comparatively small deductions—have provided the means whereby the latest extension work is being financed.

The new work is estimated to cost £11,500, the whole of which amount will be advanced by the Rural Bank, the company having made arrangements by a system of case-levy to repay the whole within ten years. It is interesting to realise that the capital expenditure for the thirty-six people involved is £29,000, and that they are prepared, in view of their experience, to go on and on with the steps that will give them what all secondary producers require to get—the control of their produce.—C. C. CRANE, Agricultural Bureau Organiser, in "Agricultural Gazette," New South Wales.

Improvement of Dairy Cattle in Irish Free State.

According to the Department of Agriculture there has been a most gratifying expansion of the measures for the improvement of dairy cattle in the Irish Free State. The number of Cow Testing Associations has been increased from 154 to 208, and the number of cows under test from 26,000 to nearly 54,000. It is estimated that approximately 230 associations will be recognised for the year 1927, representing an increase of over 42 per cent., as compared with 1923. Coincident with this progress in the grading up of non-pedigree dairy cattle there has been a correspondingly satisfactory increase in the number of pedigree dairy cows brought under test and in the number of new pedigree herds established. The latter developments have been largely assisted by the provision by the Department of an increased number of high-class stock bulls at approximately half cost for the use Cow Testing Associations, and by the leasing of such animals at a nominal fee to owners of small pedigree herds, who would not otherwise be in a position to purchase suitable animals for service purposes.

Silage as an Insurance.

Under the triple heading—"More about Ensilage—A Great Insurance Policy—Costs 3s. 6d. per ton, now worth £5"—the "Quirindi Advocate" (N.S.W.) published a letter dated 19th July, 1927, from Mr. Tom Scott, of Scott Brothers "Aberfeldie," Currabubula, from which we extract the following:—

"As you know, we had a wonderful winter last year, and all sorts of rubbish grew in abundance. We had an old cultivation paddock, which grew a wonderful crop of wild oats, being in places 6 feet high. This we decided to put into pits as the only way of getting rid of them. It seemed a big undertaking to handle 400 tons of green stuff, but it turned out much easier than we expected. The first thing we did was to get in touch with Mr. M. H. Reynolds, who came along and gave all the necessary information on ensilage making, and watched it right through. The cost was an eye-opener to me. I expected it to be big, but on working it out I was surprised to find that 3s. 6d. per ton covered it—digging the pits included. To-day its value is about £5 per ton. We have been feeding sheep, cattle, and horses on it for about six weeks, and they seem to be doing all right. The cows are milking well, lambing ewes are in good order, and the lambs are good."

Green Feed Values.

Fresh green roughages and succulents in general have a low protein content, owing chiefly to the relatively large amounts of water they contain. It should be remembered, however, that succulent feeds have a value not indicated by chemical analysis. These feeds are palatable, laxative, easily digested, and stimulate milk production.—T. HAMILTON, in the "Rhodesia Agricultural Journal."

Marketing School for Farmers.

A school and institute of co-operative marketing, under the sponsorship of the Connecticut Agricultural College, the Department of Agriculture, and the co-operative associations of Connecticut, was held at Storrs, Connecticut, 16th to 19th August, the Department of Agriculture of United States of America has just announced. The purposes of the Institute, the Department says, in a written statement, are—"First, to make it possible for the men who now bear the responsibility for control and guidance of co-operative marketing in the various localities of New England to profit by each other's experience and methods and to study co-operation under the instruction of men of national reputation in the field; second, to bring some of the most promising and able of the younger farmers of New England into contact with these teachers and with the present leaders of co-operation in order that they may be prepared to take up the burden of responsibility when their time comes."

"VERY MUCH APPRECIATED."

Thus a Collinsville farmer, when writing to renew his subscription to the Journal: "The information in this Journal is quite inviting and very much appreciated."

The Home and the Garden.

THE COOKING OF MEATS.

MISS M. A. WYLIE, Inspectress and Organiser Domestic Science,
Education Department, Western Australia.*

FRYING.

A large variety of dishes may be cooked by frying, and, when well done, this is a very satisfactory means of cooking small pieces of meat, fish, batters, and potatoes. When speed is necessary, it is a convenient method, as by it the fibre of food is quickly softened and cooked. A knowledge of a few scientific facts, however, is essential to success. Unless this knowledge is put into practice, failure is inevitable and an indigestible product results.

Frying is boiling in hot fat. Fat is formed of fatty acids and glycerine, the acids varying in the different fats and oils, e.g., the acid of tallow is stearic acid, that of olive and other oils is oleic acid. A simple classification of fats is as follows:—Animal fats: tallow, lard, suet; vegetable fats: olive oil, palm and cocoanut oil, and linseed oil; fish oils. For frying, the fat should be clarified, that is, it should be sweet, clean, fresh, and free from salt. If stale, the acid predominates, making it rancid, though the staleness is only due to foreign matter. Salt fat, when used, prevents proper browning. Dripping, skimmings from stock, oil, lard or butter may be rendered fit for cooking. Lard does not give as good a result as beef or mutton dripping, as it so often leaves a coating of fat on the surface of the food. When butter is used, a slow fire is necessary, as it is a substance that heats and burns quickly. Very often, olive oil is used, as many consider it the best of fats for frying. It, also, heats rapidly and therefore requires a slow fire.

Common fats remain solid at the ordinary temperature of air, but melt at about 160 deg. Fahr., and boil at 350 deg. to 450 deg. Fahr. When boiling, fat ceases to sizzle and bubble, becoming still with a slight blue fume—not smoke—rising from it. It is the presence of water in fat which causes the bubbling. Water boils at 212 deg. Fahr. . . . Therefore when the bubbles occur it is merely the water content boiling. When this is evaporated the temperature of the fat rises to its boiling point (350 deg. to 450 deg. Fahr.).

There are two methods of frying: shallow (often called English frying), and deep, or French frying. Chops, steak, pancakes, liver, eggs, and omelettes may be cooked by the first method; rissoles, fishcakes, doughnuts, potato chips, fish, apple fritters and similar dishes require the second method.

General Directions for Shallow Frying.

1. Place in pan sufficient fat to keep substance from adhering.
2. Heat fat till blue fume rises and surface is still.
3. Lightly and quickly brown substance evenly on both sides (e.g., chops and steaks) to harden surface albumen and so prevent escape of juices.
4. Then cook slowly ten to twelve minutes, turning with a knife.
5. Serve very hot.

Deep Frying—General Directions.

1. Prepare saucepan half full of fat (1 to 2 lb.), or enough to cover substance to be fried.
2. Heat till blue fume rises and surface is still.
3. Immerse substance, lowering it gently into the fat.
4. Cook till a golden brown; generally requires 3 to 5 minutes.
5. Drain on crumpled kitchen paper.
6. Serve on paper d'oyley on hot dish. Garnish neatly.
7. Remove fat from fire immediately, strain to be ready for further use.

Food cooked in this way should be protected by means of a covering of egg and bread crumbs, flour, batter, or oatmeal.

Of the two methods, deep frying is easily the more economical, since, though it requires more fat at the time, this can be strained and used again and again. As well, time is saved, as most foods only take three or four minutes to cook thoroughly when treated in this way.

In yet another way deep frying has the advantage over shallow, for, in this latter method, the large amount of water which is contained in the food quickly reduces the temperature of the small amount of fat, causing a semi-steaming and boiling process to ensue. Thus the fat is liable to penetrate the food and form a coating round each fibre, rendering it difficult of digestion; whereas in deep frying the fat, by retaining its temperature (since the water in the food does not so materially affect the larger amount of fat), gives crispness to the productive covering which prevents penetration into the food by the fat.

---

* In the "Journal of Agriculture," Western Australia.

Recipes—Shallow Frying.

Liver and Bacon.

1 liver (calf's, lamb's, sheep or ox liver).
¼ to ½ lb. of fat bacon rashers.
1 tablespoonful of flour.
Pepper, salt, dripping.

1. Cut liver into neat pieces, ⅓ in. thick.
2. Dip each piece into seasoned flour. This will help to keep in the red juices and prevent the fat from penetrating.
3. Cover bottom of frying pan with dripping (about ¼ in. in depth when melted). Bring to boiling (fuming) point, then put in each piece of liver.
4. Fry 5 minutes on one side and 4 on the other.
5. Place in centre of a hot dish and serve with brown gravy and grilled or fried rolls of bacon. Garnish with finely chopped parsley.

Note.—Cut bacon in thin slices, remove rind. Roll up lightly and thread each roll on a skewer. This may be grilled over the fire or cooked in the oven while the liver is being fried.

Fried Cutlets.

Cutlets.
1 egg.
8 tablespoons bread crumbs.
½ teaspoon salt. Pepper.
Dripping.

Method.

1. Trim cutlets, removing skin and gristle. Leave about 2 in. bare bone.
2. Beat egg on plate. Season.
3. Place bread crumbs on kitchen paper.
4. Dip cutlets into eggs and crumbs. Press each cutlet firmly with a knife and shake off loose crumbs.
5. Melt fat in pan and, when fuming hot, put in cutlets. Fry about 10 minutes.
6. Drain cutlets on kitchen paper.
7. Serve on mound or wall of mashed potatoes on hot dish with tomato sauce.

Recipes—Deep Frying.

Fish Cakes.

½ lb. of cold scraps of fish or tin of salmon.
¼ lb. to ½ lb. of cooked potatoes.
1 egg. Bread crumbs.
1 teaspoon chopped parsley.
Salt and pepper.
2 tablespoons of milk or liquor from the fish.
Dripping. Flour.

Method.

1. Remove bones and break fish up finely.
2. Mash and warm potatoes. Add to fish with parsley, pepper, salt. Mix well.
3. Beat egg. Add milk if necessary. Use part of this or liquor from fish to bind the mixture.
4. Divide into even pieces. Mould into shape, using very little flour.
5. Dip in egg and bread crumbs.
6. Fry in deep fat. Drain.
7. Serve on paper d'oyley. Garnish with lemon and parsley.

THE KING'S "PLUM DUFF"—AN EMPIRE CHRISTMAS PUDDING.

The King's chef, Mr. Cédard, has supplied the Empire Marketing Board, so the Secretary of the Board (Mr. S. G. Tallents) informs us, with the following recipe for an Empire Christmas pudding:—

5 lb. of currants
5 lb. of sultanas
5 lb. of stoned raisins
1½ lb. of minced apple
5 lb. of bread crumbs
5 lb. of beef suet
2 lb. of cut candied peel
2½ lb. of flour
2½ lb. of sugar.
20 eggs
2 oz. ground cinnamon
1½ oz. ground cloves
1½ oz. ground nutmegs
1 teaspoonful pudding spice
1 gill brandy
2 gills rum
2 quarts old beer

For the ordinary family, quantities would, of course, be proportionately less. It is significant that all the ingredients are produced within the Empire and Australian fruits and other products will be used by the King's cook in the Christmas pudding for their Majesties' own table.

MANURING ROSES.

"I never put manure near a rose stalk. I make holes between (half way) the trees, about 12 to 18 in. deep, and the watering once a week is sufficient to carry the good of the manure which is buried in these holes to the trees."—E.F.B. in "South African Gardening."

BONEMEAL FOR THE LAWN.

"As the lawn is generally visible from the house windows, surface dressing in the spring is often neglected on account of the unsightly appearance that is almost unavoidable. Try dressing with bone meal, using 4 oz. to the square yard. It will greatly help in producing a deep green velvety lawn, without being noticeable when applied."—M.B. in "Popular Gardening."

THE MANURE HEAP.

Where farmyard manure has to be stored for a time, it should be carefully kept, in order to conserve the rich ingredients and prevent their draining away. The shape of the heap, of course, depends on the amount and the available space; any shape does, as long as something is placed on top to keep off heavy rains. Stack the manure on the north side of the garden, or at least shaded from too hot sunshine. See that the soil underneath is tramped or rolled firm, and when building the manure on this, spread it out evenly, mix it well, and beat it down firmly. If during the season it appears to get very dry, sprinkle a little water on it to keep it moist. A tub or barrel should be buried near the manure heap, and in such a place that all the liquid flows into it. Every manure heap slowly "sweats" or exudes a brown liquid, which is a very rich fertiliser, and should always be saved. When diluted, this liquid can be used freely.

HOUSE ASHES.

House ashes or cinders should be saved and utilised in the garden. Where the garden is heavy or clayey, they can be spread on the surface and dug into the soil; they will then assist the process of disintegration, opening up the clay and helping at the same time to aerate and drain the ground. Fine, gritty house ashes spread round young plants will keep off slugs and prevent them from doing damage. The fine, dusty matter from the fire may be mixed with soot and used to dust the plants for insecticidal purposes. The large cinders should be used in the boiler fire. When planting bushes of any kind in the garden, mix a little lime with the larger cinders and place a good layer of these in the bottom of the trench. This facilitates drainage, preventing water from stagnating round the roots, and helps to keep pests from burrowing up amongst the roots of the bush. Clinkers, unless of the very finest, should not be used in the garden. The manurial value of cinder is practically nil.

THE CULTIVATION OF THE GERBERA.

Gerberas seem to like a moderately heavy soil best. Red volcanic soils suit them to perfection.

Good drainage is very important. A northerly slope is the ideal spot, open to all the sunlight, for Gerberas are true sun-worshippers. If you have not a northerly aspect, plant the Gerberas along the northern side of a paling fence or wall.

Thoroughly dig the soil to a depth of 18 inches; mix with it some well-decayed cow or horse manure, burnt grass or other vegetable matter; raise the beds slightly, say three or four inches, above the level of the path; tread down the soil firmly, and place your plants in position.

Narrow beds, with two rows of plants placed about 15 to 18 inches apart, will do nicely. After putting out your plants, just keep the soil moist; do not attempt to overdo the watering. Then, beyond pulling out the weeds, leave your plants almost entirely alone.

Purchase the best plants you can obtain. Seedlings, of course, have all their life before them, but you never know what colours you are likely to get. If they are small plants, they may turn out nearly all pale yellows or washy shades. Sections of vigorous plants which have flowered will give entire satisfaction if properly handled.

Do not forget to make the soil firm around the plants. Mulch the surface with rotted leaves or grass. You will then reap a harvest of beautiful flowers, which are not excelled for decorations, over a period of many months.

KITCHEN GARDEN.

Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered; otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.

Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked layer beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Topdress all lawns.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weeds of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of ''maori,'' and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, ''Early ripe, early rotten,'' applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture ncessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

Farm Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasseling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resisting. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well-balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

Seed Maize for Sale

All previous lists are cancelled

To growers desirous of obtaining a pure and reliable strain of improved seed, the following variety is being offered, and represents a limited stock raised from selected strains of Departmental seed:—

Improved Yellow Dent

Conditions of Sale

Applications for seed, with accompanying remittance (exchange added), should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane. Postal address and name of Railway Station should be given, also date seed should be sent from Brisbane.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed, should any matters require adjustment.

Price

To enable applicants living at a distance to benefit, a flat rate of 11s. per bushel is being charged. This price includes all railage to the nearest railway station, but where steamer freight is necessary, this and any charges in relation thereto must be paid by the purchaser and the cost thereof added to the remittance.

Description

Improved Yellow Dent.—A tall-growing, late-maturing variety—five to five and a-half months. The ears are cylindrical in shape, carrying sixteen to eighteen tightly-packed rows. The grain is deep, wedge-shaped, of rich amber colour, with a yellow tip cap and rough crease dent. It is suitable for coastal districts and scrub lands where there is a good rainfall. It is capable of giving heavy yields of grain and fodder. Special strains of this seed have yielded over 100 bushels per acre under field conditions.

The other varieties previously advertised have all been disposed of.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

					MOONRISE.	
1927.	November.		December.		Nov.	Dec.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.3	6.9	4.50	6.32	a.m. 9.41	a.m. 10.31
2	5.2	6.10	4.50	6.32	10.37	11.34
3	5.1	6.11	4.50	6.33	11.37	p.m. 12.35
4	5.0	6.11	4.50	6.34	p.m. 12.42	1.39
5	5.0	6.12	4.50	6.35	1.44	2.42
6	4.59	6.13	4.50	6.35	2.49	3.49
7	4.58	6.13	4.50	6.36	3.56	4.56
8	4.57	6.14	4.50	6.37	5.3	6.6
9	4.57	6.15	4.50	6.37	6.12	7.15
10	4.56	6.15	4.51	6.38	7.22	8.19
11	4.56	6.16	4.51	6.39	8.32	9.16
12	4.55	6.17	4.51	6.40	9.36	10.8
13	4.55	6.18	4.51	6.40	10.36	10.52
14	4.54	6.18	4.52	6.41	11.30	11.30
15	4.54	6.19	4.52	6.41	...	...
16	4.53	6.20	4.52	6.42	a.m. 12.17	a.m. 12.4
17	4.53	6.21	4.52	6.43	12.55	12.35
18	4.53	6.21	4.53	6.43	1.30	1.3
19	4.52	6.22	4.53	6.44	2.3	1.33
20	4.52	6.23	4.54	6.44	2.33	2.3
21	4.51	6.24	4.54	6.45	3.2	2.36
22	4.51	6.25	4.55	6.46	3.32	3.13
23	4.51	6.26	4.55	6.46	4.3	3.52
24	4.51	6.27	4.56	6.47	4.36	4.39
25	4.51	6.28	4.56	6.47	5.14	5.30
26	4.50	6.29	4.57	6.47	5.56	6.25
27	4.50	6.29	4.57	6.48	6.44	7.24
28	4.50	6.30	4.58	6.48	7.36	8.25
29	4.50	6.31	4.59	6.48	8.32	9.27
30	4.50	6.31	5.0	6.49	9.30	10.28
31	...	...	5.0	6.49	...	11.30

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

3 Nov.	(	First Quarter	1 16 a.m.
9 ,,	○	Full Moon	4 36 p.m.
16 ,,	)	Last Quarter	3 28 p.m.
24 ,,	●	New Moon	8 9 p.m.

Perigee 9th November, at 1 18 a.m.
Apogee 21st November, at 4 54 p.m.

On the 3rd the occultation of Kappa Capricorni by the Moon will occur about 9.45 p.m at Rockhampton and somewhat earlier at more northern places in Queensland.

It will be interesting to notice the nearness of Jupiter and the Moon late at night on the 5th, especially near the time of the Moon's setting.

Between 10.30 p.m. and 11 p.m. on the 10th Omega Tauri will be occulted by the Moon.

The inferior conjunction of Mercury with the Sun on the 10th will be of special interest on this occasion as the planet will make a transit of the Sun's face.

On the morning of the 21st, Venus will be at its greatest altitude above the eastern horizon, and at about 3 a.m. the crescent Moon, with its horns towards it, will help to form a pretty spectacle

On the 25th, Mercury will be at its greatest western elongation and its greatest height above the eastern horizon before sunrise.

The Southern Cross will reach its lowest point, represented by VI. on the clock face, in its circle round the celestial pole before midnight during November, and will therefore be absent from the evening sky.

2 Dec.	(	First Quarter	12 14 p.m.
9 ,,	○	Full Moon	3 32 a.m.
16 ,,	)	Last Quarter	10 3 a.m.
24 ,,	●	New Moon	2 13 p.m.
31 ,,	(	First Quarter	9 22 p.m.

Perigee 7th December, at 7 11 a.m.
Apogee 19th December, at 8 24 a.m.

The occultation of Psi Aquarii by the Moon will commence shortly before it rises on the 2nd, but its reappearance on the illuminated side of the Moon may be watched with telescope or binoculars at places as far east as Warwick, Toowoomba, Brisbane, &c., between 12.15 p.m. and 12.25 p.m.

Saturn will be in conjunction with the Sun on the 3rd, when it will be about 900 million of miles beyond the Sun and so nearly on a line with it as to be invisible. A week or two later it will be coming into view in the early morning, with some of the stars of Scorpio, about an hour before sunrise.

A total eclipse of the Moon will take place after midnight of the 8th December. It will first be observable about nine minutes to 2 a.m. on the 9th, when the Moon has passed the meridian and is descending towards the west. Totality will last from 2.54 a.m. to 4.14 a.m., but another hour will elapse before the Moon entirely emerges from the shadow of the earth, so that it will set while partially eclipsed at places on the eastern side of Australia after the Sun has risen.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Sch
of Art FREE on prepayment of 1/- to c
postage. Members of Agricultural Societies,
5/-, including postage. General Public, 10/-
including postage.

13 JAN 1928

QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXVIII. 1 DECEMBER, 1927. Part 6.

Event and Comment.

The Wheat Yield—Record Bushel Weights—Estimate Exceeded.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith), in the course of a recent press announcement, expressed satisfaction with the statement of the Wheat Board concerning the extraordinarily high bushel weight of the new season's wheat in course of daily delivery at the Board's numerous depôts, ranging as it does from 64 to 67 lb. per bushel straight from the harvesting machines, and constituting what appears to be a world's record in this respect. These results go to strengthen the principle so generally advocated by the Department that the wheatgrower who designs and bases his cultivation and other work on scientific lines must ultimately succeed. It augurs well for the future development of this State that improved agricultural practices are gradually tending towards increased production which modern civilisation now demands. This harvest's high bushel weight will be associated nearly everywhere with high yields, and the estimated return of a few weeks ago should be easily surpassed. These yields go to show the possibilities of the development of the State as a producer of wheat, and give promise that wheat-growing might be engaged in successfully on a more extensive scale than at present, particularly in newer districts, such as the South-Western areas.

Last summer's rains were well up to the average, and where careful methods of cultivation were followed crop results were entirely satisfactory. Happily, the June rainfall was generous, fully 3 inches in most parts, and although the falls were light enough during the growing season of the wheat, rendering the outlook anything but promising in September, the October rains saved the situation, and the present magnificent crop is the result.

One has only to witness the activity displayed at the Wheat Board's receiving depots to realise the advantages of the growers' own system of organised marketing. "It is gratifying to know," added the Minister, "that the growers generally and their representatives on the Board are alive to the advantages of co-operating with the officers of the Department of Agriculture who are assisting to put the wheatgrowing industry on a better footing. Wheats bred and carefully tested out by the several Field Officers of the Department are now well distributed throughout the Wheat Belt. Some of these come under the category of high bushel weight combined with yield. 'Watchman' wheat, grown in the Maranoa district, is a notable example with an official weight of 68 lb. to the bushel (against the standard of 60 lb. to the bushel). This variety is a production of the Roma State Farm, and it is significant also that the first crop harvested this year in the Allora district, 'Novo,' which yielded 40 bushels to the acre, also had its origin at the Roma State Farm.

"A record crop of 'Pusa' wheat, grown in the Pilton district the season before last, returned 46½ bushels per acre. It is not at all unlikely that even this extraordinary yield will be exceeded this harvest. It is interesting to note that about twenty years ago a few grains of this variety were obtained in an exchange from India, and after a series of trials extending over several years to test the adaptability of the variety to Queensland conditions, it was brought into general cultivation, and ranks as one of the most favoured varieties at the present time.

"The recent innovation in the way of a Wheat Crop Competition will promote a great deal of interest, and will focus a closer attention on the part of the growers to the esentials of wheatgrowing as a business. The fifty-one crops entered in the competition are reported upon by Mr. Quodling, Director of Agriculture, the judge of the competing wheats, as being generally of a very high standard."

Queensland at Work—A Picture of the Tropical North.

"NOWHERE else can the same rural energy be seen—the fertile land oozing wealth, the busy farmers breaking in their fields and renewing their crops, the canecutters slashing down their abundant harvest, the fussy tramway engines dragging long lines of cane-laden trolleys through the fields to the nearest mill, where, working twenty-four hours a day with three shifts, elaborate machinery, and contented workers are squeezing out Australia's sugar." Mr. Donald Mackinnon, some time High Commissioner for Australia in America, had that to say in the course of a recent Press interview in Melbourne on North Queensland affairs. "The sugar belt, from Townsville to Cairns," he added, "is at the moment the most heartening part of Australia that any Australian can look upon. Our country can nowhere else show the same spectacle of man-directed energy. Nowhere else in the world is the white man handling tropical production with such success. There is a big Australian responsibility on those who are building up this part of our country. It is our vulnerable frontier, and we must be watchful lest, through misconception, we do them an injustice and discourage them in their important responsibility."

The Romance of Queensland.

"QUEENSLAND has more romance in its settlement than any other State," said Mr. Amery, Secretary of State for the Dominions in the British Cabinet, at a public function at Maryborough, which he visited in the course of his recent tour in this State. He added that it had been borne upon him what a great and rich State Queensland was. First, there was the romance in the fact that Queenslanders had courageously developed this great heritage of theirs with white labour. They had departed from all the experience of the past, and had embarked upon the experiment of building up a white civilisation from top to bottom in a tropical country. He warned them to avoid the great evils which resulted from a mixture of races of people of different planes of civilisation. They would certainly have to face difficulties—difficulties which to many other nations had appeared to be insurmountable. Time alone would show whether the ability and resource of her people would enable them to solve those difficulties. They had gone a long way towards vindicating the policy of a "White Australia" that they had set up. They had built up the sugar industry in Queensland by white labour. That was a great achievement, as that industry had hitherto been regarded as being capable of development by black labour only. He knew perfectly well that the maintenance of the sugar industry involved considerable sacrifices upon the part of Australia as a whole. But they had achieved this much. They had built up a great industry, which was conducted on a high level of technical efficiency, and by that means had supported a considerable population along this Queensland coast, which was capable in time of great development. Thus the experiment was at least well worth making. Time alone would show how far it would be successful. He was sure they had been well advised not to complicate their national life with racial problems. A policy such as the "White Australia" policy had never been attempted before in any part of the Dominions. Therefore, in respect of Queensland, that constituted a romance in itself

The Finger Cherry Causes Total Blindness—A Warning.

RECENT pathetic cases of total blindness in children, caused through their eating the fruit of the native loquat or finger cherry, have again aroused public attention. Warnings have been issued repeatedly by this Department as to the risk of eating or even handling this native fruit. In collaboration with the Department of Public Instruction, another notification has been widely circulated which emphasises the danger of its consumption which leads to the paralysing of the optic nerve followed by total and permanent blindness, and even death. A number of cases, the Minister for Public Instruction (Mr. Thos. Wilson) said, in his announcement to the Press, had lately been reported from the Cairns district, but his Department had taken action in this respect as far back as 1914. The circular just issued contained a coloured illustration, and one was being sent to each group of sixty children so that ample provision was made for the bigger schools. The printed statements in the circular set forth the danger accompanying consumption of the finger cherry and warning children against handling, eating, or having anything whatever to do with it. Teachers were asked frequently to direct the attention of the children to the illustration and facts set forth in the circular. The fruit occurred in the scrub lands between the Herbert River and a point beyond Cooktown. It has also been reported as existing as far south as Mackay.

An American Looks at Australia.

COLONEL BIRCH HELMS, representative of Messrs. Blair and Co., one of the leading bond operating houses in New York, lately visited Australia to investigate financial conditions. In the monthly publication of Blair and Co. he has issued a short statement of his impressions. He describes Australia as "a virgin land with wonderful pastoral prospects. In time it will feed and clothe the world, with its tremendous resources of wheat and wool, beef, dairy products, and fruit." The country, he says, has a promising future, but in attaining the peak of its development large investments of foreign capital will be required. Here England and the United States will find a useful opportunity for the investment of their funds. He says that through the adoption of a protective tariff Australia is endeavouring to build up an industrial community in its midst, and large foreign corporations are establishing their manufacturing plants in the several States of the Commonwealth. However, pastoral and agricultural development seemed to Colonel Birch Helms to be the great promise of Australia for the next few years, as the climate, like that of California, is very salubrious and equable. In fact, the average man lives under better conditions and has more time for recreation than has any other individual on the face of the earth—the American not excepted. Australia is described as an ideal country for pioneering Britons and Americans to settle in, just as was the Far West of the United States in the early eighty's. The pioneer spirit, he remarks, is welcomed in Australia, for it is this spirit of the country which is evidenced in the establishment of a new capital at Canberra for the Commonwealth, now aged only twenty-six years.

Primary Produce Experiment Stations.

FROM a farmer's point of view the most important measure submitted to Parliament in the present session was the Primary Produce Experiment Stations Bill, which was introduced by the Secretary for Agriculture (Mr. W. Forgan Smith) on 8th November. The object of this measure is to establish experiment stations to serve agriculture in general along lines similar to the organisation of the Sugar Experiment Stations, which have proved so valuable in the sugar industry. Under its provisions more immediate consideration will be given to banana-growing, which has developed into one of our best land-settling agencies. Further expansion of this industry must follow intenser settlement of our tropical jungle lands and, as in other forms of husbandry, the effective control of pests and diseases is a substantial factor in its success. Science is to be called into economic service, and by the establishment of experiment stations in what might be called strategical areas, it is planned to equip the banana-grower with all the information and guidance necessary for him to solve his biological, pathological, and cultural difficulties. Much research work of immense benefit to the industry has already been done by both the Department and the University, but it is obvious that the establishment of an experiment station right in the field, so to speak, will be followed by greater co-ordination of effort in community service and more active co-operation of the farmer with the scientist in the fight against the pests and diseases that levy undue toll on primary industry. One of the special features of this issue is the report of the Minister's second-reading speech on the measure, which will be read with interest by all concerned in the enrichment of our rural life.

Bureau of Sugar Experiment Stations.

THE SEASON'S SUGAR PRODUCTION.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) has announced that the tonnage of cane to be crushed this season, according to the estimates supplied by the mills, is about 3,576,092 tons.

This should give an output of some 483,000 tons of raw sugar of 94 net titre for Queensland, which will be the highest production, with the exception of 1925, when it reached 485,585 tons of raw sugar for Queensland.

The present season has been exceptionally favourable to the ripening of the crop, and the commercial cane sugar in the cane has been on the high side at nearly every sugar-mill.

The production in New South Wales will be about 23,000 tons of raw sugar. This is not so good a crop as last year. With the small production of beet sugar in Victoria, the total yield for Australia should be about 508,000 tons, practically all raw sugar, and it has been necessary to export sugar overseas in larger quantities than in 1926.

ENTOMOLOGICAL ADVICE TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Be Ready to Combat French's Cane Beetle.

During the present season third-stage grubs of *Lepidiota frenchi* Blkb. may be expected to cause local damage to young shoots of plant and ratoon cane. These grubs, after having passed the winter in their second instar in resting-cells situated from 15 to 20 inches below ground, usually moult for the last time as soon as warm weather commences, and making their way to the upper and warmer portion of the soil start feeding again.

Keep a good lookout for indications of the presence of this cane pest, which is betrayed by sudden wilting and yellowing of the affected shoots. Fortunately such attack is generally confined to small areas, and on this account may easily be overlooked when affecting a stool here and there. In the event of decided infestation, extending over several square chains, it is advisable to fumigate the stools with carbon bisulphide. This should be done with as little delay as possible, as two or three third-stage grubs of this beetle are able to effect serious root damage in a period of twenty-four hours. Use an ordinary hand pal-injector, such as can be supplied by Danks and Co., of Melbourne, or Cooper, Pegler, and Co., Limited, London E.C. Allow at least four days to elapse after a heavy downpour before fumigating friable well-drained volcanic soils, and six to eight days in the case of clay-loams.

Treat both sides of affected rows with ¼ oz. injections made 15 to 18 inches apart and 4 to 5 inches from the nearest plants.

Keep the top soil in loose well-worked condition throughout the aerial existence or flighting season of the beetles.

Watch for Emergence of Cane Beetles.

Greyback cane beetles are likely to emerge this month, immediately after the first heavy thunder showers. Any farmer chancing to notice unusual numbers of these beetles congregating in one place, in a manner suggesting that something might have attracted them to the spot, are asked to at once communicate with the Entomologist at Meringa Experiment Station, by 'phone or by wire, in order that such occurrence may receive thorough investigation.

In the event of large numbers of greybacks being observed in feeding-trees growing close to cane land, these should be collected and destroyed. Control work of this kind will be found profitable during a period of about six weeks dating from the day of emergence of cockchafers from the soil. The position near fences of favourite food-plants of this cane beetle—notably the native figs of either small-leaved varieties, such as the "weeping fig" or broad-leaved kinds, or the so-called "Moreton Bay Ash" (*Eucalyptus tessalaris*)—should be located a few days before appearance of the beetles, to be collected from during the flighting season.

Moth Borers are still doing Damage.

Young shoots of ratoon or plant cane showing "dead-hearts" should be cut out, taking care to sever same at a point about 2 inches below ground level, and be either burnt or crushed to destroy caterpillars or pupæ or moth borers, three species of which are at present breeding in cane shoots.

CANE BORING INSECTS.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report from Mr. J. H. Buzacott (Assistant to Entomologist at Meringa Experiment Station) on a recent visit to the Babinda area. This was undertaken in order to obtain puparia of Ceromasia sphenophori, and to make certain observations in connection with the occurrence in that district of various cane-boring insects.

BABINDA.

This district was visited on the 2nd October, and whilst there the opportunity was taken to inspect some of the outlying sections as well as farms in the immediate vicinity of the town.

Beetle Borer *(Rhabdocnemis obscurus* Bois.).

The beetle borer was the chief pest met with, and this was fairly bad everywhere. The infestation was at its worst in Badila crops, although Clark's Seedling had also suffered considerably.

On many farms Tachinid flies were found to be firmly established, but these latter received a severe check during the cyclone; for whilst the terrific wind and rain would easily destroy the delicate adult flies, at the same time damaged cane and humid weather would present ideal conditions for a heavier infestation of borers. In fact, the borer was noticeably present in the tops of practically all cane that had been injured during the blow.

Grubs.

Very few blocks of cane obviously affected by grubs were seen, and an area at Mooliba which, last year, was markedly attacked, this year shows no indication of their presence. On one selection at Bartle Frere, male digger wasps were seen in large numbers, flying over the ground between the rows of young cane and presumably awaiting the emergence of females.

Large Moth Borer *(Phragmatiphila truncata* Walk.).

"Dead-hearts" caused by caterpillars of the large moth borer were in evidence everywhere, particularly in cane closely bordered by dirty headlands. Quite a number of pupæ were found on stripping the trash from the tops of the cane.

Tineid Moth Borer *(Ephysteris cheresaea* Meyr.).

Larvæ of this minute insect cause similar damage to that caused by the large moth borer, but the Tineid only tunnels in very young shoots, principally of ratoon cane. It was encountered in many places, and at Mooliba was seriously damaging the shoots of young ratoons.

Bud Moth *(Opogona glycyphaga* Meyr.).

The bud moth was quite common, but its larvæ did not appear to be causing severe damage anywhere.

Army Worms.

One of the species of army worm (*Cirphis unipuncta*) was very prevalent, and at Babinda was responsible for stripping to the midrib the leaves of 7 acres of young plant cane. At the time when the inspection was made, all the larvæ had pupated in the soil, and an Ichneumonid wasp (*Lissopimpla scutata* Krieg.), one of the chief pupal parasites of this army worm, was to be seen in thousands flying over the field. It is probable that very few of that destructive brood of caterpillars will escape the assault of the Ichneumons and various other parasites, and so the cane will not be further destroyed by an attack of a second and larger brood of plague worms.

Other of the very minor pests were observed, such as Linear bugs, aphides, and leaf-eating beetles, but as these were not of any economic importance, no comment is made upon them.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report from the Entomologist at Meringa, Mr. E. Jarvis, on the work of this Experiment Station during the period, September to October, 1927:—

Fumigation of Pupae of Greyback Cockchafer.

Laboratory experiments conducted at Meringa during August, 1921, proved conclusively that pupæ of this cane beetle, when lying in compact soil, quickly succumb to fumigation with carbon bisulphide, the fumes from which appear to find ready entrance through the large open spiracles described last month (August to September report). Following up this matter, preliminary field tests conducted during September, 1921, demonstrated that this fumigant is able also to penetrate through the walls of the subterranean pupal chamber of this beetle; injections made at a depth of 8 inches from the surface in ploughed ground proving fatal to pupæ lying at an average depth of 11 inches. Subsequently, in 1923, it was found that half-ounce injections of bisulphide, administered on both sides of rows on which the cane had been destroyed by grubs, and placed 15 inches apart, 6 inches from centre of stools, and 8 inches deep, yielded excellent results on red volcanic high land, which had been ploughed about 5 inches deep. When examined twenty-four hours later we discovered that the fumes had entered pupal cells situated fully 18 inches below the surface, and in those where transformation from pupa to perfect insect had taken place had killed the beetles.

Some of the Dangers induced by "High Cutting."

An extract from a publication dealing with the control of conditions associated with root diseases of sugar-cane appeared in last month's "Australian Sugar Journal" (vol. xix., p. 372), in which certain ill-effects likely to result from the careless practice of high cutting were pointed out by the author, J. A. Faris, of the Cuba Central Experiment Station.

Irrespective, however, of such drawbacks as reduction of plant vitality—owing to the failure of shoots springing from buds above ground to establish roots—it will interest Queensland growers to learn that in portions of the Cairns district high cutting has a tendency to encourage the activities and distribution of the smallest of our three common moth borers of cane, *Ephysterus chersæa* Meyr.

This little insect, which has been termed "Tineid moth borer" (see Bulletins Nos. 11, 18, 19, 3 (revised edition)), was described by the present writer in the year 1919, when bred for the first time from young ratoons collected at Meringa, Kamma, and Pyramid, the tiny caterpillar tunnels in the basal portion of young cane shoots (5 to 10 inches high) biting through the central core and killing the heart-leaves. Outwardly the damage corresponds in general appearance with "dead hearts" caused by our two other moth borers, *Phragmatiphila truncata* Walk. and *Fossifrontia* sp. Unlike larvæ of the latter moth, however, the caterpillars of *E. chersæa* never feed upon or inhabit the central rotting core, often, indeed, vacating a shoot as soon as having tunnelled across the juicy basal portion, and entering another ratoon. During August, 1926, an outbreak of this borer occurred at Redlynch, Stratford, and Freshwater, near Cairns, among ratoons growing both in alluvial sandy soils, and high lands of volcanic origin; the cane attacked being in all cases Badila.

Further, during the present month (September, 1927), this pest was reported by Mr. J. H. Buzacott, Assistant to Entomologist, as occurring rather commonly in shoots of ratoon cane on various cane areas around Mooliba, in the Babinda district.

Not being an indigenous species but having, in the opinion of Dr. Guy A. K. Marshall, been probably introduced into Australia from Natal, it is quite possible that in the absence of its own natural enemies and other controlling agencies this insect might in a country like Australia increase abnormally and, perhaps, become troublesome to canegrowers in the near future. In India it bores the stems of rice plants (*Oryza sativa*) and certain native grasses, but appears to be effectively controlled in that country by its natural parasites.

In the Cairns district this moth attacks chiefly ratoons which, on account of high cutting, happen to spring from buds situated above ground level, such injury being far less noticeable among shoots of plant or first ratoon crops which originate mostly from buried eyes. During an infestation at Pyramid, occurring on a clay-loam river flat, an average of about one-third of all the ratoons in each of the twenty stools examined—taken from three different spots on the affected plantation—had been destroyed by moth borers during a period of less than four weeks' growth; about 50 per cent. of this loss having been effected by *Ephysteria chersæa.*

Plate 145.

Example of Good Cutting, at about Ground Level, showing Position of Borer Tunnels close to the Ground, amongst adventitious roots due to shaded conditions between the Cane Rows.

High Cutting Encourages Breeding of Weevil Borers.

Growers should note also that high cutting of cane chancing to be infected by the beetle borer, *Rhabdocnemis obscurus* Boisd. cannot be too strongly condemned.

The larvæ (grubs) and pupæ of this dangerous pest generally occur in the last inch or two of the stick nearest the ground, this being especially the case in light infestations, when the bottom of the cane at about ground level is almost invariably the portion attacked. One of the best methods of controlling this beetle borer is to cut the crop low, by which means practically all the larvæ and pupæ likely to be present on a plantation are thus removed from the land and destroyed during the process of milling. In the event of high cutting of the crop, however, a large percentage are sure to be left behind, and these larvæ, after transforming into pupæ and stopping in their tunnels for a time, ultimately produce beetles which at once turn their attention to next season's ratoons.

The accompanying photo. of basal portions of cane sticks (from a crop slightly attacked) illustrate the abovementioned habit of this insect of injuring the cane at about ground level.

Evidence of this may often be seen on trucks of borer-affected cane standing in a mill yard, where it will be noticed that about 60 per cent. or more of such damage is usually betrayed by holes in the bottom ends of the sticks, indicating where tunnels of this beetle borer have been cut through transversely.

Controlling Third-stage Grubs of *Lepidiota frenchi* Blkb.

In districts where good rains were experienced in September the grubs of *Lepidiota frenchi* ("French's cane beetle") may be expected to cause damage during the next three months (October to December). This will be effected by grubs which have passed the winter in resting cells, 15 to 20 inches below ground level; and after moulting into the third instar made their way to the surface upon feeling the approach of warm weather.

Damage by this pest is fortunately confined mostly to small areas of a square chain or so, on which in many cases only a few stools are seriously affected; external symptoms resembling those caused by grubs of the greyback cockchafer.

Upon first observing signs of wilting or yellowing of the leaves, no time should be lost before fumigating such stools with carbon bisulphide. Be careful to allow at least four days to elapse after a heavy downpour before treating friable, well-drained soils, and six to eight days in the case of clay-loams.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report upon the Mossman district from the Assistant to Pathologist, Mr. E. J. F. Wood, B.Sc., for the period 5th October to 13th October, 1927:—

MOSSMAN.

The disease situation in this district seems to have improved upon that which prevailed last year, for many fields have been pointed out to me as having been ploughed out owing to Leaf Stripe infection. As the season is more than half over, the present is rather an unsatisfactory time to come, as it tends to lower the percentage of disease observed. Much of the ratoon cane is not yet old enough to allow of inspection, and this will be the case until the new year. Furthermore, many of the blocks which remain uncut at present will be ploughed out, as cane intended for ratoons is usually cut earlier to give the crops time to mature for next year. For these reasons the inspection made recently will give an erroneous idea of the amount of disease present, as it is apparent to one in the district that Leaf Stripe is more prevalent than my figures for the farms inspected show. The work given in this report is based on the general trend of things in the area.

I am very pleased that the mill is attacking the question of seed control, and must congratulate the manager and cane inspector on the vigour with which they are working along these lines. The farmers are urged to buy all plants from other farms solely through the mill, so that they will have a reasonable chance of getting healthy plants. I am also glad to see that many farmers appreciate the effort that the mill is making in this direction, and I think that they may rest assured that the Pathological Staff of the Bureau will give them all the assistance that they can. The cane inspectors usually make a preliminary inspection of cane which is to be sent to another farm, and this is the only satisfactory way of exchanging plants.

I know of one case where a farmer was warned by one of our staff that a block of cane was diseased, and, subsequently sold it to other farmers for plants. Luckily, they were warned in time, and the majority did not plant it. This sort of thing is criminal, and steps should be taken to punish a farmer who knowingly sells badly diseased cane, and thus jeopardises the whole district. This sort of thing undoes all the work that others may do to control the disease situation.

There is still one stool of Mosaic in the area, and the farmer through negligence still allows it to remain. It has now been there two years, and the farmer has known about it. Just at present it is not showing, as the cane has just been cut, but I urge him to get rid of it as soon as it does show.

Leaf Stripe and Leaf Scald are the two serious diseases in the district, and both are widely distributed. The former attacks B. 147, Q. 855, and D. 1135, so that these canes should be carefully watched, as also should Pompey, which is being planted on the poorer soils. Where the disease is bad the cane should be ploughed out after harvesting, as the wind-blown fruits are easily carried, and the disease can spread rapidly with the prevailing wind. In lightly infected fields, the diseased stools should be ploughed out, especially on those to windward. Burning the trash of infected fields is advisable, and the wholesale burning of cane probably tends to prevent the disease from spreading more than it does.

Leaf Scald was observed to be causing considerable damage in a field of Badila at Whyambeel Creek, and in Goru and Clark's Seedling near the town. The latter two canes are affected all over the area, though there are some farms in which the latter variety is clean. On one farm the disease was seen badly affecting a young field of plant cane of this variety—due entirely to lack of seed selection. This field was planted by contract without proper supervision. Luckily most of the diseased cane was dying, but not enough to prevent a few stools carrying the trouble over to the ratoons.

In the Mowbray area no Leaf Scald or Leaf Stripe was found, and here is a source of clean seed cane for the other areas. On some of the farms on the River, Spindle Top was seen, though this trouble seems very restricted. Other farms were apparently clean, and the thick black Badila is the truest to type seen since I left Ingham.

The following areas were visited:—Both banks of Whyambeel Creek up to Falls Creek, Saltwater, Myalo, Boondarra, Ferndale, Cassowary, and Mossman itself; and Scald and Stripe occur in all of them.

With regard to varieties—

Badila needs careful attention and selection of plants to free it from Leaf Scald.

Clark's Seedling (H.Q. 426) is a very sweet cane and well suited to the area, but is very susceptible to Leaf Scald, though not to Leaf Stripe. Farmers with infected fields should get rid of the variety as soon as possible and then get clean seed from another farm through the cane inspector. Scald will wipe out the cane, as at Goondi.

Goru should be a prohibited variety, as it is only a carrier for Leaf Scald.

Pompey should be carefully watched and its planting regulated, as it is known to be highly susceptible to Leaf Scald and Leaf Stripe. I regard it as dangerous in this area.

Q. 813 is a cane with very fine powers of disease resistance, and gives a fair crop with a good density. It matures early, strikes and ratoons well. It is not planted nearly as much as it deserves.

E.K. 28 gives a good density and crop, planted at the right time, but is a slow striker and ratooner. It should not be planted at Mossman before September, and matures late. It is susceptible to disease and should be watched.

Korpi, Oramboo, Nanemo are apparently giving good crops in tonnage and c.c.s., and the two former canes are worth a thorough trial. The latter is suspected of being susceptible to Leaf Scald, though little exact information on these canes is available.

B. 147 is highly susceptible to Leaf Stripe and should not be planted where this disease is present. Otherwise it is a good cane.

Q. 855 is also susceptible to Leaf Stripe, but is a good variety otherwise.

B. 156 is susceptible to disease, and is not a desirable cane.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report on the Cairns district from the Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) for the period 13th October to 16th November:—

CAIRNS.

The disease situation in the Cairns district is not satisfactory, as, apart from the presence of Leaf Scald and Top Rot, which are widespread, there are Mosaic, Gumming, and Leaf Stripe in limited areas, and the farmers do not seem to realise sufficiently the importance of exterminating them before they become a serious menace to the industry. It is in order to impress this aspect on them that I submitted a separate report on the Mosaic and Gumming situation in this area.

Leaf Scald.

Leaf Scald is widespread, and was observed in the Mulgrave area at Aloomba, and right through to Deeral. It is very prevalent in this area, but less so at Highleigh, and occurs on most farms at Riverston, Upper Mulgrave, and the Little Mulgrave. In the Hambledon area the disease is, on the whole, more prevalent than at Mulgrave. No plant control is exercised, and the result is ignorance on the part of the farmer, who is also uninterested in control, so long as the diseases do not interfere with his tonnage. The percentage of diseased plant cane was, I think, greater than that at any other mill except South Johnstone, and perhaps Mourilyan.

Top Rot.

Top Rot is occurring all over the area, and is very puzzling in the aspect that it presents. It was seen on the Upper and Lower Mulgrave, at Aloomba, Sawmill Pocket, and through the Gap, at Freshwater, Redlynch, Jungarra, and Smithfield. It seems to be at its worst, however, on the river flats. In all cases it is in the "red streak" stage, and has been reported to have appeared and disappeared again in the course of a fortnight. On one farm a field was inspected and found free, and a fortnight later showed the disease on reinspection. At the beginning of my visit (17th October) the disease was hard to find, even on farms which are, as a rule, very subject to the disease, while at the end, a month later, it was showing up very markedly on most farms in the Freshwater area, where it seems to be most prevalent.

Leaf Stripe.

Leaf Stripe is confined to a small patch at Highleigh which is to be ploughed out, one which is being carefully rogued and on which no disease could be seen at Hambledon, and four farms at Sawmill Pocket. The affected varieties are D. 1135 and Pompey. Clark's Seedling, both at Mossman and on the Burdekin, seems to have some powers of resistance to this disease, and it would perhaps be well to replace the susceptible canes by this variety, for the time being at any rate. The danger lies in the susceptibility of B. 147 to the disease, as this cane is extensively grown in the Mulgrave area, and is gaining favour at Hambledon.

Cane Varieties.

It is suggested that, if possible, the varieties Korpi and Oramboo be introduced to the areas, as Pompey and Clark's Seedling are susceptible to diseases. Nanemo seems to be susceptible to Scald, for this disease was seen in the variety at Babinda, and in the Mulgrave. Q. 813 is a cane worth growing, and some farmers have already had good results from this cane. The resistance of this cane to disease is well known.

The farmers are urged to do their utmost to get rid of the diseases which are just coming into the district, even if it necessitates drastic measures, and to watch the planting of all Badila and other canes so as to control Leaf Scald.

Farmers in the Cairns district who desire information with regard to diseases should get in touch with Mr. Curlewis, the secretary of the Cane Growers' Council, who will communicate with me, or with the Pathologist who happens to be nearest.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (17th November, 1927), on Mosaic Disease in the Cairns district, from the Assistant to Pathologist, Mr. E. J. F. Wood, B.Sc.:—

Mosaic Disease in the Cairns District.

This disease has previously been reported by Mr. Gibson, Northern Field Assistant, from two farms in the Hambledon area, and the occurrence was confirmed by Mr. Kelly, of the Bureau. It was seen in both cases in Shahjahanpur, a cane after the Uba type, which has a thin stick and is a profuse stooler and is, in Queensland, 100 per cent. infected with Mosaic as far as our records go.

I have to report a new occurrence of the disease in the Mulgrave area, where no previous records of the trouble exist, except for an isolated case at Aloomba in H. 109. This block and one of the infected farms at Hambledon have been ploughed out, but the other block, which has been in existence for some years, is being cut, and the farmer promises to plough it out.

An example of the danger of leaving such a field came under my notice recently. A farmer happening to be on this farm saw the cane which is carrying the disease, and which incidentally shows little signs of the infection, and thinking it a new variety, took some plants home, with which he filled up the misses in some plant cane (Pompey). Now Pompey is a highly susceptible variety which shows up the disease very markedly in loss of tonnage, and the spindling and dwarfing of the stick, so that, had I not gone on to the farm when I did, it is possible that all his varieties would have been badly infected during the next few years, for all his canes (H.Q. 426, Pompey, and D. 1135) are very susceptible. In this way, the negligence of one farmer and the extreme carelessness of another might have laid the district open to an epidemic of another serious cane disease.

With regard to the Mulgrave outbreak, which occurs at Highleigh, this is in two fields of B. 156, the plants in both cases having been brought from Mossman. This cane is highly susceptible to disease, especially Mosaic, and should on no account be planted in the Mulgrave area, especially after this discovery. Both the farmers on whose farms the disease occurs have planted up areas of the diseased cane, and this is going to serve as a source of infection to the other farms and varieties in the district. The farmers are urged to get rid of these fields as soon as possible. It would pay them to plough the canes straight out, and to cut their losses.

A rather peculiar feature about the Mosaic in the Cairns district has been its slowness in spreading by secondary infection, and this is possibly due to the fact that the carrier is not present in the area or is at least unimportant. Many farmers, especially in the Mulgrave area, have recently planted corn, and it is well known that the corn aphis is an insect vector of Mosaic. Whether this insect is present on the corn I do not know, but I do not doubt that it will soon become so, and when it does we will have the complete cycle for the spread of the disease. I have seen Mosaic on the corn so planted. For that reason I would warn the farmers against the planting of maize, as they will see from Mr. Bell's reports to the Bureau, the ravages of Mosaic where it is grown with corn in Louisiana.

We must look to the immediate future as well as to the present, and even the biggest rivers have small beginnings. It is from such negligence, or lack of knowledge as I have instanced above, that most of the serious epidemics of diseases in canes have begun. The introduction of half a dozen sticks of gummed cane is supposed to have caused a serious outbreak of this disease on the Clarence. This is the reason for my stressing the occurrence of this disease, which is able to cause most serious ravages.

It has done so in South Africa, where they have been reduced to the planting of Uba, which is, I think, agreed by men who have studied the question to be a very retrograde step, but the only one which could cope with the situation. This is the opinion of all those whom I have met who have studied the Uba question abroad. The same course was adopted in Porto Rico, and the Bulletins which they published at the time show what ravages the disease was causing there. Cuba controlled the disease by seed selection and rogueing or digging out the diseased stools, and vast sums of money were spent on this. In Louisiana the position is still critical, as Mr. Bell's report shows, and even in the southern districts of Queensland the position is far from satisfactory.

Mosaic is an insidious disease which does not seem to affect the crop to any extent, and may at the same time reduce the tonnage very greatly. Five tons per acre are not unusual, but this does not appear to any extent to a man looking at the field, and 5 tons on 30 acres are 150 tons, roughly £300.

The time to strike is at present, before the disease gets a hold. It is wrong to say "it is not spreading" and to take no more notice, for by the time it really does spread it will be too late to eradicate the disease without very great expense.

Gumming.

The gumming situation at Aloomba seems to have improved considerably, and only one farm was seen to be infected. The cane was H. 109, and the farmer has ratooned it again in spite of my advice. Gum is an insidious disease and seems to lie dormant sometimes for long periods, so it is hard to state the exact position. Farmers should watch for a recurrence of the disease, and should plough out the cane as soon as possible after they notice the trouble. There is no need to do more than to point to the trouble which the Bundaberg mills have had with gum this year.

Cane Crops Prospects.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, who has been visiting the sugar districts of Cairns, Innisfail, Mourilyan, South Johnstone, Herbert River, Mackay, and Bundaberg, has returned to Brisbane. He reports that the present season has, on the whole, been particularly favourable to the growth of cane, and has also had a marked influence in ripening the crops, so that the commercial cane sugar this year has been exceptionally high. The consequence will be a large yield, second only to the 1925 season.

In every district the outlook for next year is most favourable, and if the ensuing climatic conditions are good, it is possible that the 1925 season may be eclipsed.

CAIRNS.

At Cairns, the mills were working smoothly and putting through large tonnages of cane every week. The crop, due to the cyclone earlier in the year, was not so large as in the two previous years, but was of excellent quality. Great quantities of sugar were being manufactured and shipped away. Parts of the Cairns district were dry and wanted rain, but showers have since fallen.

A visit was made to the Atherton Tableland with the secretary of the Cairns-Mossman Cane Growers' Executive (Mr. Curlewis), and the Mulgrave Mill cane inspector (Mr. Hoare) and two officers of the Sugar Bureau, for the purpose of inspecting cane growing on the Tableland and at the Kairi State Farm as to its suitability for plants, and to ascertain if a supply could be depended on. The Cairns executive have taken this matter in hand, and the Bureau will, by means of its officers, inspect the cane from time to time as to freedom from pests and diseases.

JOHNSTONE RIVER.

The next district visited was the Johnstone River. At Innisfail the weather had been dry and cool for some time, but useful showers were then falling. The cane was cutting out well. Matters at South Johnstone Mill had considerably settled down, and the mill was putting through about 6,800 tons of cane per week. Owing to the long drawn out industrial turmoil, however, it will be impossible to crush all the cane, and the estimate has been reduced by some 50,000 tons of cane, some of which being cut late last year may stand over. Up to the end of October 81,000 tons of cane had been crushed.

The Goondi Mill was doing fine work, and it is expected that all the crop will be harvested by the end of this month.

At Mourilyan, a new fourth mill had been put in. This factory was experiencing a good run. The average commercial cane sugar for the season had been 14.5 per cent., but at the end of October was 15.3 per cent. Many new improvements to the mill were noticed.

The Tully Mill was handling a big crop and working most successfully. The very high tonnage of 8,051 was put through the rollers during one week.

Owing to shipping shortage sugar stocks were not getting away as rapidly as desired. 2,500 tons of raw sugar were stored at Mourilyan, and 3,500 at the South Johnstone Mill.

Grubs were not very bad this season, but the beetle borer was greatly in evidence. The most serious disease is Leaf Scald, to which the Pathologist of the Bureau was devoting considerable attention.

Owing to the prolonged cool weather the germination of the young plant cane was slower than usual at this time of year.

The harvesting of the experiment plot at South Johnstone was finished on the 25th October. Some of the new seedlings raised at that station had given fine results, one in particular yielding 77 tons of cane and 11 tons of sugar per acre. It is hoped that next year a few of these new South Johnstone seedlings will be available for distribution.

HERBERT RIVER.

Thanks to the courtesy of the Colonial Sugar Company's officials, the writer was enabled to see a great deal of the Herbert River in a short time. This district has made a wonderful recovery from the appalling disaster which overtook it in February last by floods. Nature can overcome its ravages, but the large loss of life which then took place will not be forgotten quickly. Large plantings of cane have taken place in all areas, and, if favourable weather ensues, a tremendous crop is anticipated for next year. Grubs were not doing much damage and the beetle borer is not affecting more than 1 per cent. of the cane. The disease situation is being kept well in hand by the company on the Herbert River.

MACKAY.

A record crop is being harvested in the Mackay district, and it is anticipated that 100,000 tons of sugar may be manufactured. The present official estimate for Mackay is 98,000, but if the commercial cane sugar content is maintained the crop may easily reach the century. This district is in a very prosperous condition, as land values have never been inflated and the wealth produced is largely spent in the district. The mills are all doing excellent work, and some high tonnages are being crushed weekly. The commercial cane sugar is very high. Demonstrations of the Falkiner Cane Harvester were taking place during October. This is an elaborate machine, very different to the original. It is not yet perfect, and requires further experimentation.

The Farleigh Mill at Mackay has a big crop this year, and since its taking over by the farmers last season has been doing well. A large tonnage of cane (55,000 tons) is now drawn from the Northern coastal areas opened up by the railway. It is contemplated to put in a new large fourth mill next year. The mill has done and is continuing to do good work. At one time a large quantity of Uba cane was grown (up to 25 per cent.). This has now declined to 2 per cent.

BUNDABERG.

A fine harvest is also being experienced in the Bundaberg district, though some crops were affected by frost earlier in the year, and a considerable area has been injured by the gumming disease, which, unfortunately, is very prevalent this season. More resistant varieties must be introduced. So far Q. 813 and H. 227 show great resistance to the gumming disease. Varieties showing high resistance to this disease in other countries have been imported by the Sugar Bureau for trial, and it is also hoped that some of the new South Johnstone seedlings will also prove resistant.

The weather experienced in the North was wonderfully cool for this time of year, due to the prevalence of south-easterly winds. As a rule, the north wind is much in evidence in October and November, but not so this year. Another factor was the continued cloudy weather. It looks like a repetition of the 1916 season, which was followed by a record crop. Everywhere large areas have been planted, and if conditions remain favourable a large crop should eventuate next year.

The Assistant to the Entomologist at Meringa, Mr. J. H. Buzacott, has submitted the following report (18th November, 1927) to the Bureau of Sugar Experiment Stations:—

HAMBLEDON AREA.

The following pests were observed during the week ending 10th November, on farms served by the Hambledon Mill:—

Wasps Attacking Sorghum.

On the 1st November a visit was made to Redlynch to observe some wasps attacking a crop of sorghum out there. They proved to be specimens of a small *Crabronid* which were nesting in the stems up near the seed head by tunnelling out the pith and stocking the cavity thus formed with small flies (*Acalyptrata* and *Trypetidæ*). Practically every stick in the small crop examined was treated in this manner, the nest occupying about a foot of the upper end of the stem. The infestation is hardly of economic importance, as neither the growth nor the seeding of the sorghum seems to have been affected, although in a heavy wind the weakening of the stems thus would probably cause them to break.

It is most unlikely that this same insect would ever tackle cane, unless perhaps the stem of the arrow when the cane went to seed.

Beetle Borer.

Some farms on the Barron River flats, which in the last few years have not had beetle borers, are suffering from its ravages this year. The February flood and cyclone is probably responsible for this spread or reappearance, whichever it may be, but the infestation was comparatively light in every case which came under notice.

Moth Borers.

The moth borer has been bad at Sawmill Pocket this season as evidenced by the large number of "dead-hearts" to be seen. These are particularly numerous in places where the flood deposited debris.

In Stratford, Freshwater, and Redlynch "dead-hearts" were also fairly common.

Tineid Moth Borer.

This little pest (*Ephysteris chersœa*) was damaging young ratoons at Redlynch and Freshwater.

Grubs.

Grubs of French's Cane Beetle (*Lepidiota frenchi*) are up working after their resting period deep down in the ground. They are now in the third stage, and are considerably damaging cane in Sawmill Pocket. They are eating the sets of young cane bare of roots, and the consequent wilting and dying of the leaves is becoming very noticeable.

Termites.

A small species of termite (*Coptotermes* sp.) was discovered to be the cause of young plant cane dying on a farm at Edmonton. The termite was completely hollowing the sets, thereby removing the shoot's source of nourishment. The field in which they were observed was surrounded by forest and the soil was very dry. It was probably to obtain moisture that the termites attacked the cane. The small brown house ant (*Pheidole megacephala*) was exerting a considerable control by attacking the termites.

Leaf-eating Beetle.

The leaf-eating beetle (*Rhyparida morosa*) was found congregating on a small fig plant (*Ficus opposita*) growing in a canefield. There must have been many hundreds of the small beetles on the fig, and riddled cane leaves nearby showed that they had not confined their attentions to the fig leaves.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available for publication the following report for the period October-November, 1927, from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

THE CANE-ROOT APHIS.

Mention was made in a previous report (see "Queensland Agricultural Journal," October, 1927, page 338) of a subterranean aphis which attacks the roots of sugar-cane, and which was found in association with the mound-building ant *Aphænogaster longiceps* Sm. This aphis is in all probability a native species, but on account of its secluded life it has remained unnoticed and undescribed. The actual instances of subterranean aphides attacking cane roots in Queensland have been comparatively rare, but as aphides are much more numerous in temperate regions than in the tropics, it is likely that more of these insects will be met with in these parts, as the entomology of sugar-cane is more thoroughly investigated in the southern sugar districts.

Although only of minor importance as a cane pest, it was thought advisable at this juncture to record the occurrence of this aphis in connection with sugar-cane. It was first noticed on the roots of ratoon cane at Oakwood, in the Bundaberg district, where numbers were found in the galleries which had been excavated by the ant *A. longiceps*. More recently, Mr. Bates, of this station, while carrying out investigations in Childers concerning cane grub control, found the same aphis attacking young plant cane. On this Childers farm, it was attended by a common small brown ant *Pheidole proxima* Meyr., and by the combined activities of the aphis and ant, the cane attacked showed a noticeable yellowing and appeared to be very weak.

So far, the winged form has not been found, but an attempt is being made to breed this form in order to establish its identity. The form most frequently met with is the wingless vivaparous female, and the following is a brief description of it:—

> Large pear-shaped, light yellowish coloured aphis about 3.5 mm. in length, and about 2.25 mm. at its greatest width, the body being covered with small hairs and also with a light dusting of a powdery secretion, which renders it of a duller appearance. It is without cornicles.

This species appears to be dependent to a great extent on ants, for none have so far been found on cane roots where ants have been absent. As many as thirty have been found clustered together on the roots of young plant cane, but in the case of ratoon cane they seem to be more evenly distributed over the larger root system and it is more usual to find them in groups of five or thereabouts. Nymphs, or the immature forms, when first produced are of a rich buttery yellow, and after the lapse of a few days they secrete the white powdery covering which is present on the adult insects, but they are somewhat darker in colour than the adult insect.

The writer has found the same aphis feeding on the roots of nut grass, though they were not so plentiful there as on the cane roots nearby. Thus the mere ploughing out of cane would not serve as a check on this insect, for nut grass would act as a host during the time the land was fallow, and subsequent generations would reinfest cane when it was again planted on that land. The real solution of the problem seems to be the extermination of the ants.

The Small Brown Ant *(Pheidole proxima* Meyr.).

This ant, which is a very common one in our canefields, not only becomes a pest indirectly through its attendance on such sap-sucking insects as aphides and mealy bugs, but is, itself, at times also directly responsible for minor damage to cane.

From its liking for the sweet globules of honey dew proffered by these insects, it is easy to understand that the sweet juices of mature sugar-cane would also be readily accepted and sought after by them. When cane sets of the variety Q. 813 were planted for experimental purposes during this spring, ants of the above species were found to have invaded the sets, tunnelling under the hard rind and eating the softer central portion of the cane stick. This undermining of the rind at the nodes, at points from which spring the roots, prevented many of the roots from developing as they would have done under normal conditions.

These ants are often found nesting in portions of cane stools, and it is probable that they are responsible for more damage than was hitherto supposed.

GRUBS FOR "GRUB."

TURNING CANE PESTS TO PROFITABLE ACCOUNT.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report from the Entomologist to the Bureau at Meringa (Mr. E. Jarvis) dealing with some of the ways in which "greyback" cockchafers and their grubs when collected in great numbers may be profitably utilised:—

Profit in Cane Beetles.

In view of the fact that in some of our sugar-growing districts vast numbers of cane beetles and their grubs are annually collected and destroyed, it is advisable to briefly outline a few of the ways in which such valuable organic material—amounting at times to many tons in weight—may be turned to profitable account.

About the year 1913, for example, growers in the Cairns district alone caught 22 tons of "greyback" cockchafers, representing no less than 10,644,480 individual beetles, which, after being weighed in by the "receiver," were merely emptied out of the sacks and thrown away.

In Russia or France, however, the monetary value of these insects would certainly have been recognised, and the bodies converted into manure by the following process.

How to Convert Cane Beetles into Manure.

One of the best methods is to dig a pit in firm sub-soil, a few yards long, and of a width and depth of about 5 feet.

After throwing into it sufficient beetles to form a layer 3 or 4 inches deep, stir in enough lime water to prevent any specimens from crawling out, then sprinkle a dressing of dry lime over them, and on top of this a layer of earth about 9 inches in depth. Continue to fill in with alternate layers of beetles, lime, and soil, until the pit is full. In this way a manure can be prepared from cockchafers equal in value to some of the good commercial fertilisers. That obtained from the European species known as the "May Bug" (*Melolontha melolontha*) is said by Guenaux to "equal that of

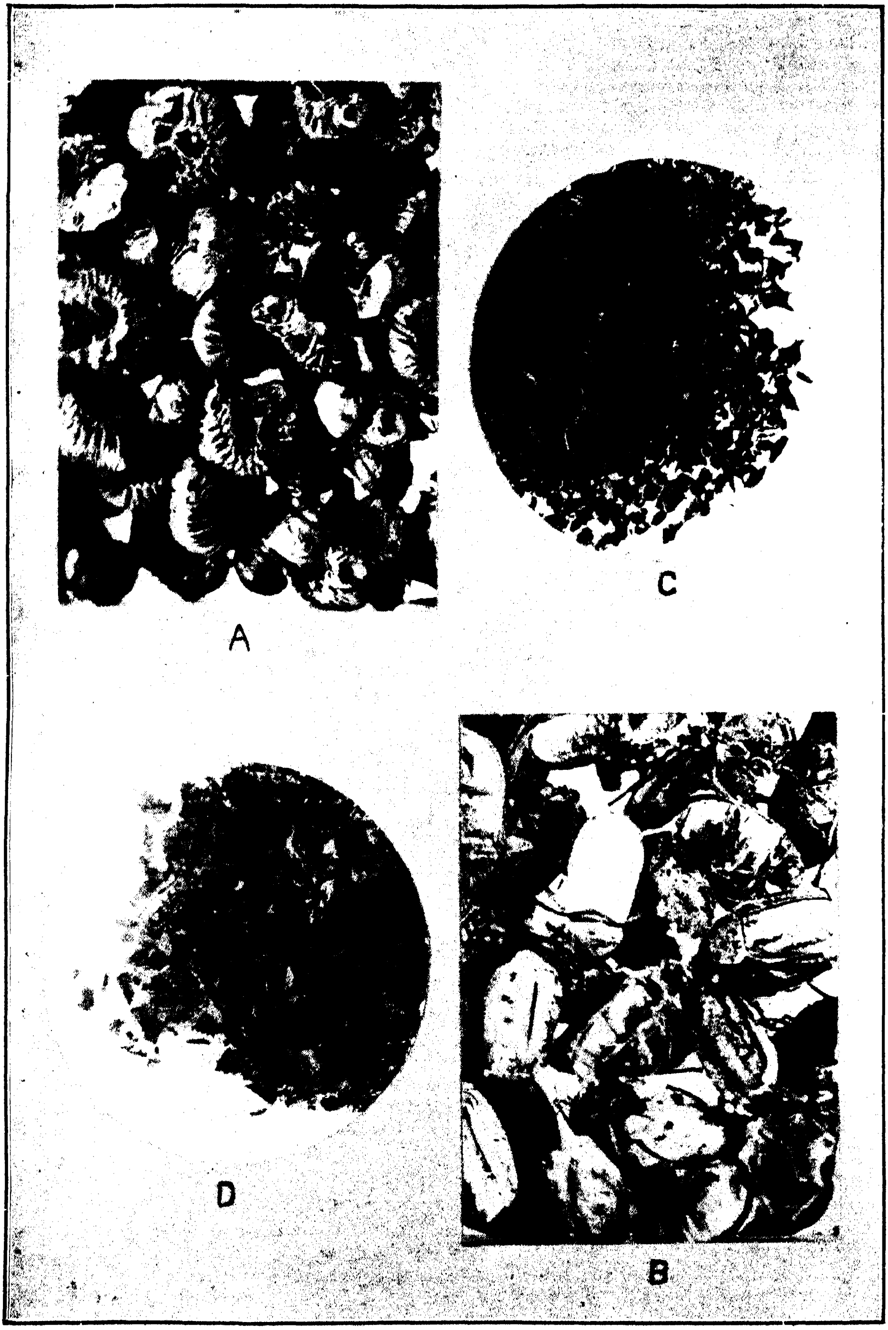


PLATE 146.

A.—Dried grubs of "Greyback" Cane Beetle.
B.—Dried "Greyback" Cockchafers (*Lepidoderma albohirtum* Waterh.).
C.—Meal prepared from the dried grubs.
D.—Meal prepared from dried Cane Beetles.
(All photos natural size, original.)

the best manure as regards phosphoric acid and potash, and is eight times richer in nitrogen. One hundred pounds of beetles are, therefore,'' he remarks, ''equal to 800 lb. of manure, of a value of about 3s.''

The dried bodies of our own ''greyback'' beetle contain 10.20 per cent. of nitrogen, 1.75 of potash, 1.66 of phosphoric acid, 63.75 of proteins, 4.82 of fat, and 1.75 of lime.

Value of Cockchafers as a Poultry Food.

The very large percentage of proteins (63.75 per cent.) contained in dried bodies of our cane beetle, *L. albohirtum*, makes this insect exceptionally valuable as a food for poultry, small animals, and insectivorous birds. It should be mentioned here, that when the first specimens of this beetle were analysed in the year 1922, it was found, to the surprise of those interested in this matter, that the specimens tested contained 0.16 per cent. of arsenic.

The reason for the presence of this poison was thought at the time to be probably due to the fact that the beetles analysed had been caught close to canefields in which the soil had been treated with large quantities of arsenious acid (white arsenic), administered at depths of 3 or 4 inches at the rate of 80 to 200 lb. per acre amongst cane roots upon which grubs of this species were feeding. Seeing that these grubs are continually ingesting, and passing soil through their bodies to extract any organic matter, it appeared likely that the amount of arsenic swallowed by them in this way—although not enough to prove fatal—might gradually accumulate, and be retained in the system throughout the pupal and beetle condition. This supposition was ultimately proved to be correct, as samples of grubs and beetles of *albohirtum* caught during the last year or two and submitted to Marsh's test were found to be free from any trace of arsenic.

When visiting the Sydney Zoological Gardens in 1923, I showed examples of dried grubs and ''greyback'' cockchafers to the Curator, and we threw them to insectivorous birds, &c., to see if they would eat them dry, either whole or when broken into pieces. Mr. Le Souef subsequently discovered that his birds preferred them in a softened condition, and later on advised me as follows:—

> ''The grubs that you left were very good food, and when soaked were readily taken by our insectivorous birds. We would be glad if you would quote for the food at per lb. We might be able to use about 100 lb. per annum.''

It should be mentioned here that when discussing this matter with the Curator he told me there was a sure market in Sydney for dried grubs, and there would be no difficulty in disposing of large quantities at a good price.

The most profitable way in which to market a commodity of this kind would be in the form of small packets holding about 3 or 4 oz., got up after the style of those sold to bird-fanciers, containing dried insects, puparia of flies, ant-pupæ, &c. This preparation commands a ready sale, as many kinds of birds and small animals will not thrive properly in confinement unless supplied at intervals with some such natural animal food containing certain vitamines that appear essential to their wellbeing.

A coarse meal, consisting of the crushed bodies of our grubs and ''greyback'' cockchafer beetles, could be more easily prepared than the abovementioned article, and would probably meet with as ready a sale. The wholesomeness and palatability of this insect as poultry food is evidenced by the avidity with which these grubs and beetles are greedily devoured by our native insectivorous birds and mammals.

In some parts of Russia the cockchafers, when used for poultry food, are first mixed with an equal volume of bran.

Cockchafers used as a Cattle Food.

It will be of interest to state here that during the year 1918, in which a flight of the destructive cockchafer, *Melolontha melolontha*, was expected, an order was issued by the Swiss Department of National Economy desiring all Communes to collect, kill, and utilise these beetles. ''Special emphasis,'' states N. Criddle, ''is laid on this last point, as these insects form a valuable cattle food.''

Obtaining Oil from Cockchafer Beetles.

The method usually adopted in other countries for extracting oil from the bodies of these beetles is to crush them in barrels or tubs until a completely homogeneous dough is obtained, which, after the addition of water ''is left,'' we are told by Professor A. Novak, ''for three or four months. The oil rises gradually to the surface and is removed. It can be used for ordinary lamps, giving a good flame without odour or smoke; about 20 litres of oil are obtained from 100 litres of beetles. To extract the fat, the beetles are killed with chloroform or formalin, and then placed in a glazed earthenware vessel, into which a narrow pipe is inserted, reaching to the bottom of the pot; the vessel is covered with a lid, having a hole for the passage of the pipe, and when this is heated on a slow fire, the fat will gradually flow out from the pipe. This becomes thick after cooling.''

Cane Grubs as a Food for Man.

About eleven years ago, during the great war, some very interesting experiments were made in the United States to determine the food value of grubs of beetles to the genus *Lachnosterna,* which in that country attack the roots of sugar-cane.

It was thought by Dr. L. O. Howard, Chief Entomologist at Washington, that in view of the shortage and increasing price of old staple foods at that particular time, practical suggestions regarding any cheap inexpensive foods would be eagerly welcomed by the general public. ''Doubtless many foods,'' he remarks, ''now considered excellent were first discovered by starving people. Possibly oysters, clams, snails, crabs, lobster, crawfish, and shrimps were first eaten by people who could get no other food. . . . Two kinds of insects from the viewpoint of abundance and possible food value at once suggest themselves—namely, grasshoppers, and the larvæ of *Lachnosterna* in this country, and of *Melolontha* in Europe, the so-called 'white grubs.' ''

During the course of the experiments in question, *Lachnosterna* grubs were served up in the form of stew, salad, soups, &c., the various seasonings used for these foods being salt, vinegar, butter, pepper, oil, paprika, and onions. A party of ten gentlemen (prominent American entomologists) tasted and compared notes as to the flavour of the different dishes from which the grubs were eaten as well as the broth. The stew was considered by most present to taste much like crab meat and lobster.

''All thought it agreeable, and were sorry when it was all done.'' Those who drank the broth preparation ''agreed that it was not only perfectly unobjectionable but really appetising.''

The salad also was ''found very palatable,'' although in chewing, all those present discarded the tough skin of the grubs.

The general conclusion arrived at, as a result of varied experimentation, is practically embodied in the following statement made by Dr. Howard:—''I feel sure that 'white grubs' will be shown to have a positive food value, and am equally sure that the prejudice against insects as food is perfectly unreasonable.''

This opinion, coming as it does from one of the world's leading economic entomologists, and being based on results obtained from practical research work, should exercise a marked influence on any further developments of a like nature that may become necessary in the future.

It may be mentioned, in conclusion, that the protein content of beetles belonging to the genera *Melolontha* and *Lachnosterna* have been found by analyses to be similar both in character and quantity to those contained in the higher animals which form a part of human food.

FIELD REPORTS.

The Central Field Assistant, Mr. E. H. Osborn, reports (1st November, 1927):—

BANANA POCKET.

A short visit was paid to this fertile area in the middle of September, and the conditions were found to be very good, for practically all varieties of cane were yielding good tonnages and satisfactory density. The original estimate of 12,000 tons still holds good.

Many new residences were noticed, and three substantial bridges over Saltwater Creek have been constructed. Vegetables grow splendidly hereabouts, potatoes especially being a very payable proposition, for one grower had disposed of 10 tons at £16 per ton, and still had another 4 tons awaiting sale.

Varieties.

The main varieties are N.G. 15 (Badila), N.G. 426 (Clark's Seedling), M. 1900, and Q. 813, with smaller quantities of other canes. N.G. 15 grows splendidly, one block of third ratoons looking good enough for a 30-ton crop, whilst September plant was lying down profusely and should run into a 40-ton proposition. H.Q. 426 also looked very vigorous, one eleven-months-old crop yielding a 32-ton crop.

Q. 813 on the poorer of the soils was really good, one first ratoon paddock cutting a 40-ton crop, with an average density of 15.5. M. 1900 in the very heavy soils is also shaping well, whilst E.K. 28 was showing exceptionally good growth on a fairly good class of soil. H.Q. 409 was also being tried out on a small scale, but the stalks seemed too thin. The young plant cane looked well, as also did the young ratoons where worked up soon after cutting.

Diseases.

The area is very free from diseases, none being observed at the time of my visit.

Pests.

Slight damage had been done in odd places by grubs and rats. Upon the whole the prospects of the Pocket are very bright, for it possesses first-class soil, good climatic conditions, and a mighty good class of settlers (mostly ex-Diggers of the A.I.F.).

While at Banana Pocket my thanks are due to Mr. and Mrs. Lascelles for accommodation. Such help is much appreciated by the officers of this Bureau.

ROLLINGSTONE TO INGHAM.

This region, comprising the cane area supplying the Invicta mill (Giru), was next visited. Some 32,000 tons supplied by about 100 growers represents the output of the areas inspected. Crops were cutting very well for both tonnage and density.

As regards planting for next year, it seemed to be very heavy, especially about Yuruga, Helen's Hill, and Toobanna. These latter sub-areas have progressed wonderfully since my last visit some twelve months ago, and new growers were met.

At these three places crops of splendid Badila were seen growing upon soil that was formerly considered too poor and badly drained to cultivate, and yet is now turning out very good crops, although in many cases the cultivation has been rough.

Varieties.

N.G. 15, H.Q. 426, H.Q. 409, Q. 813, Korpi, Nanemo, Oramboo are grown. N.G. 15 is easily the most popular, and some fine crops were noticed. To Toobanna one grower, upon poor greyish soil, cut 118 tons from 2½ acres, getting, too, a density of 14.5 early in September, no fertiliser being used. At Coolbie, an 8-acre paddock of young N.G. 15 (hand planted and well cultivated) showed a 100 per cent. strike, and was stooling out beautifully.

H.Q. 426 is also grown to a certain extent locally, and so far looks healthy, although when its liability to gum is considered it behoves growers to be very careful, and remember that this variety is still barred by the C.S.R. Co., and that practically all the H.Q. 426 under review is the result of seed obtained from the Herbert River area, and therefore subject to suspicion.

H.Q. 409 grows well upon the poorer areas and has given good c.c.s. values, but arrows very profusely. Q. 813 upon the poorer and preferably stiffer soils turns out well, planted late, and should be more popular when its comparative freedom from disease is considered. Many inquiries were made about E.K. 28, as so far very little has been grown in the area.

Disease.

Red Rot in H.Q. 426 was noticed in several paddocks, being very bad in one plant crop at Moongabulla, the c.c.s. values for the first two tests being 12.4 and 12.9. Probably 15 per cent. of the cane had been badly attacked.

Spindle or Needle Top disease, as described by Mr. Ferguson Wood in his August report, was met with in isolated Badila stools, and is certainly accountable for a decided loss. Control measures as outlined by him are to be recommended.

GIRU.

The local mill (Invicta) had accounted for about one-half its crop when the area was inspected. Good growing conditions had been experienced, and, in consequence, the crops were both heavy and rich in sugar. Heavy plantings had taken place, the early plant looking uncommonly well. The ratoons, where worked up in time, were also very promising, some third and even fourth ratoons N.G. 15 carrying good growth.

Varieties.

Practically the same as upon the lower Burdekin. Of the newer ones E.K. 28 is very satisfactory, tonnage and density both being good; 40-ton crops averaging about 15.5 being noticed in several places. Large areas of it are now being worked for 1928.

Disease.

Very little disease of any sort was apparent, although doubtless present. Growers are advised to use the very greatest care in seed selection, and on no account to obtain seed from another area unless the same has been thoroughly inspected by a competent man.

Pests.

Grubs and borers have accounted for minor losses.

AYR.

With the exception of 95 points of rain at the end of September, dry conditions had prevailed, and nearly all the irrigation plants were busy. The crops were generally cutting up to about their estimate, but were carrying a very high density, as the following figures show for the week ending 24th September:—Kalamia, 16 c.c.s.; Pioneer, 16.16 c.c.s.

As well as the present season being satisfactory, next year's crop prospects are good, for large areas of early planted young cane were seen and are so far forward that they cannot fail to grow into heavy crops next year. Wherever one went surprisingly good crops were seen, and at present it seems that the two local mills will be heavily taxed to handle the 1928 crop. Where ratooning had been carried out straight away after harvesting the young cane was looking very well.

Varieties.

N.G. 15, H.Q. 426, B. 208, Goru, M. 1900, E.K. 28, and Q. 813 are grown, with the first three easily in the lead. Extremely good returns have been obtained from the first-named cane so far. One Norham grower started the season with a weekly average of 16.06 c.c.s. and cut 800 tons for just over 16.0 c.c.s., all in heavy plant cane.

B. 208 was also wonderfully high, another grower averaging 17.3 c.c.s. for eleven weeks, whilst another averaged 18.3 c.c.s. for one week. Its great danger to disease is, of course, the drawback, for if Leaf Stripe spreads from this variety to the others, then the damage would be very great.

E.K. 28 has given most surprisingly good results this season, from August to date, one of the best being a Brandon grower who, for a weekly average delivery of about 45 tons for the last month, has averaged 16.6 c.c.s. for a 40-ton crop, his last c.c.s. being 17.6, and a fair tonnage still to harvest.

Another Airdmillan grower is cutting a 40-ton crop of good density, which, owing to its rather backward state, had been estimated to cut 33 tons per acre. This is a particularly bad block to water, and the results are therefore most gratifying.

Practically nearly every grower has now some of this variety planted for 1928.

Diseases.

Diseases were very hard to discern at this period, Leaf Stripe in B. 208 being the only one apparent.

Pests.

White ants, grubs, borers, &c., have done a certain amount of damage in isolated places, but only to a limited extent.

The Central Field Officer, Mr. E. H. Osborne reports (*12th November*, 1927) :—

HOME HILL.

At this centre weather conditions were dry and practically all the growers were watering. Very satisfactory work was being carried out by the mill (Inkerman), and the estimated tonnage of 126,000 tons was expected to be put through by about the third week in December.

Unusually high density returns have so far characterised the season's operations, for good sugar contents as well as heavy tonnages have been obtained from many of the rich deep alluvial flats, that are generally rather low in c.c.s. As regards the prospects for 1928, there is every present prospect that a bumper crop will be harvested.

Very large areas of young plant cane were noticed looking well forward (the majority being early plant), and bar some unexpected reason should develop into a splendid crop. The young ratoons were also showing very healthy growth.

Taking the Home Hill area as a whole, it is progressing remarkably, and now that the irrigation system has become properly established its benefits are being experienced, and local growers are now far more satisfied.

Varieties.

These are practically the same as grown on the Ayr side of the river. Of the newer canes E.K. 28 is easily the most popular and has given most satisfactory results both in tonnage and density, for it roughly averages from 35 to 40 tons per acre with an average density of, say, from 15.5 to 16.0. It is also worth mentioning that in many cases these returns were obtained from land that was formerly considered too rich for this cane. So satisfactory has it proved that nearly every grower has from a small to quite a large area of the cane planted for next year. Q. 813 has also given consistently good returns on several farms, and as it becomes more acclimatised to local conditions will get more popular on some of the poorer classes of soils.

Diseases and Pests.

Very little disease was noticed during this visit, although doubtless it was present. A little Mosaic and Leaf Stripe was noticed in B. 208 young plant and young ratoons. Growers are again cautioned against planting too much of this cane so susceptible to disease, for there is nothing to stop it spreading its diseases to the other standard canes of the Burdekin, and surely growers have already enough troubles without looking for more. The after effects of Top Rot were noticed in the quantity of dead stalks on many farms that otherwise would have cut very heavy tonnages. In one or two places red streaks were noticed in young plant Badila, but only to a limited extent. *Pests.*—White ants were noticed doing minor damage mostly adjoining headlands on a number of local farms, and generally in the vicinity of dead timber. Borers had also done slight damage in many places, generally near a main drain.

BOWEN.

Very little cane is now being grown here, fruit and vegetables being the main products. The small tonnage harvested this year, however, gave better density returns than in past years. Some very good Badila in particular, as well as N.G. 24 B (green Goru), were seen. Inquiries were made for E.K. 28 for plants for next year, so it is probable that a little extra may be planted either this year or early in 1928.

MACKAY.

As only a few days were spent in this district, very few farms were inspected, and these few only in the vicinity of Racecourse Mill. This mill was crushing splendidly, averaging about 4,200 tons week after week, and showing an average c.c.s. for the season of a shade under 15.0. Crushing had been greatly facilitated by the fresh state of the cane hauled along the recently completed Homebush tramway. In the limited time at my disposal, some remarkably nice plant cane was seen, mostly looking green and healthy and in a fair state of cultivation.

Varieties.

H.Q. 426 (Clark's Seedling), Q. 813, N.G. 15 (Badila), Malagache, E.K. 28, 7 R. 428 (Pompey), M. 1900 are the most popular hereabouts, with Q. 813, H.Q. 426, and M. 1900 the chief favourites. Of these, Q. 813 certainly seems the most suitable on account of its being so free from disease, its good striking qualities, and rapid growth. H.Q. 426, unfortunately, is very liable to disease, as mentioned hereafter. M. 1900 is a very good cane to cut late, but wants watching for Red Rot. E.K. 28 is giving very good returns locally, and is liable to become more popular. It is also a late cane. Pompey (7 R. 428) upon suitable ground gives good results, and is also a late cane to harvest. Badila upon the rich deep flats is easily the most suitable cane, both for tonnage and density.

Diseases.

Red Rot in H.Q. 426 plant and ratoons and M. 1900 plant and ratoons was noticed to be doing a great deal of damage, being responsible for losses in weight and also in c.c.s. The dangers of this disease have already been outlined very comprehensively by Mr. E. J. F. Wood (Assistant Pathologist), and control measures suggested, and growers are advised to give these measures a trial, otherwise the disease is certain to spread.

The Northern Field Assistant, Mr. A. P. Gibson, reports for the month of October:—

BABINDA.

Rain and sunshine alternated. The former replenished the water supply, freshened the vegetation, and swathed the wonderful background of mountain beauty in a dripping blanket of mist.

Rainfall.

August, 1 point; total recorded for September, 397 points; that for the year has been 143.65 inches. Over 18 inches has fallen since the mill commenced crushing.

The Crop.

The cane had lost the beautiful dark-green appearance which generally denotes speedy growth. The drier and cooler conditions experienced had assisted in its removal, but had retarded its growth. Some growers appeared to be disappointed because of the poor and patchy nature of some fields. Such alternating conditions were due probably to one or more of the following conditions:—(*a*) Late harvesting; (*b*) inferior drainage coupled with early grub destruction; (*c*) improper and insufficient tilling. The crop is cutting quite up to early expectations, and the estimate of 190,000 tons remains unchanged.

Harvesting and Milling.

The cane supply is being well maintained and good progress is being made. The mill continues to run smoothly and well, turning out some 1,000 tons sugar weekly. It is working a greater number of hours weekly. This appears to be a judicious move, more especially when a factory is faced with overmuch seasonal cane. Some of the benefits are as follows:—(1) The period of crushing is shortened; (2) the subsequent crop is benefited thereby; (3) a greater percentage of the crop is milled when the cane possesses its maximum amount of sugar, therefore more sugar is made. Against this, of course, is the payment of much factory overtime. 105,000 tons of cane had been milled, and the percentage of burnt cane is gradually increasing. The average crop quality is exceptionally high, the greatest weekly c.c.s. being 16.12 per cent. This is the highest since the inception of the mill. It seems obvious that the factory must carry on into January to treat the matured cane still offering, in spite of the increased number of hours crushing.

Ratooning and Cultivation.

The unusually long stretch of rainless weather that prevailed till quite recently enabled most farmers to do more and better field work. This has been of great advantage in promoting the growth of the new crop as well as assisting to conserve the soil moisture. Ratooning is too frequently delayed; improved returns would be obtained by performing this important and necessary work as soon as practicable after trash burning. This serious fault is too general.

Varieties.

Three main sorts are grown—Badila, still the king of its kind under the northern sun and one suitably raised in the better lands; H.Q. 426, our best medium land cane and leader in the field so far as sugar is concerned. (We are afraid to recommend overmuch of this being grown owing to its great susceptibility to most diseases. This variety, however, is too valuable to lose, for, if lost, the industry would be much the poorer, therefore it behoves our farmers to devote more care when selecting seed. This alone will save it from possible extinction). The Goru canes could easily be discarded; they are only fair in sugar, and are now highly diseased. Q. 813, Oramboo, Korpi, and some E.K. 28 may be grown with profit, on selected soils.

BARTLE FRERE.

Another fine crop has been raised in the shade of Bartle Frere, Queensland's highest mountain. Canes produced on such Northern volcanic porous upland red soils generally mature more slowly than do those grown on the alluvial deposits. Some wondrously rich soil was noted at South Russell. This rather narrow stretch of land extends some 2 miles along the picturesque Russell River and is sandwiched between it and a great swamp. Leaf Scald is much too prevalent here. Farmers are urged to procure a stock of disease-free cane for their next planting.

Plant Cane.

There is a big area of plant cane. Generally, the cane had germinated favourably, and had been freshened by some rain. Planting cane in roughly made drills run out between unploughed exhausted stubbles is bad, and must finally end in disaster. My attention was drawn to a Badila seedling said to have self-germinated in a flower-pot; three plants were obtained, and these were planted on the headland of a Badila field. No difference between it and Badila could be detected by the writer, save that it had stooled wonderfully well and was outstanding in growth.

Pests and Diseases.

Where a crop is wholly carried on from cuttings there may be a rapid spread of pests and diseases, also a gradual weakening unless the greatest care is exercised when plant-selecting. Grub destruction is severe on crops growing in a salient of volcanic porous red soil jutting into the granitic kind at Bellenden-Ker, also on similar land met with over the Russell River. Weevil borer damage is acute in parts; the tachinid fly, its valued parasite, appears well established. Big moth and the Tineid moth borer were noted; their presence may easily be detected by dead hearts; the larvæ make one or more holes in the shoot about ground level and sever the leaf arrow at the base. Leaf Scald is the principal disease. This was found mainly in Goru, H.Q. 426, and to a lesser degree in Badila. The characteristics of this are much in evidence in most fields seen, and seem to vary according to variety. Unfortunately, this continues to spread, through ignorance and the want of understanding of the great importance of systematic selection of plants. We can, however, only point out such diseases, and at all times urge our farmers to do better things.

MOSSMAN.

Weather.

Bright and cloudy days and some patchy rain were experienced. A good fall of rain is urgently needed to replenish the dried creeks and freshen the now very parched vegetation. Rainfall to 12th October: Mossman, 67.00 inches; Mowbray, 53.29 inches. August, the very dry month, was of untold benefit; it was mainly responsible for bringing the 1927 crop to maturity early, also hurrying along the harvesting and cultural operations.

The Crop.

The sugar lands are scattered, and in parts vary much in quality; with judicious tilling and manuring, followed by more thoughtful plant selection, they could possibly be made to yield a higher tonnage. It seems very evident that the assigned cane area cannot produce cane enough for the mills' seasonal requirements. Early in the year the crop prospects appeared most promising, though the area to cut was known to be some 300 acres less. Generally, it was thought the tonnage to crush would not fall far short of that milled in 1926. Heavy wind and flood damage followed; this, coupled with dry weather periods and much pest destruction, had reduced the early crop forecast of 82,000 tons to 72,000. One redeeming feature, however, is the good mill work and the phenomenal quality of the crop. Many hundreds of people depend on this mill for their living.

Harvesting and Milling.

There appeared more harmony between employee and employer, and increased efficiency in field and factory. Practically all the cane is burnt prior to its harvesting; this improper practice results in untold all-round losses. Cane enough to keep the harvesters engaged for two days is burned. This is supposed to be fired between 6 p.m. and 6 a.m. It is truly difficult to accurately estimate the amount required; this, combined with fire getting out of control, frequently results in overmuch being burned. The mill average c.c.s. has been surprisingly high. The cane appeared to have reached the peak of quality about the end of September. It is indeed refreshing to note the general improvement in the condition of harvested cane and crop transportation. Rapidity in removing harvested cane from field to mill cannot be underestimated. The factory has 25 miles of portable rails. During the slack season two bridges and some 28 chains of a 30-lb line were constructed. Upwards of fifty truck wagons are used for transporting cane from field to permanent way. The weather has been ideal for their use. Forty-five thousand tons of cane had been milled to the 11th October; 27,000 yet remained. The factory is crushing about 4,700 tons weekly, and making upwards of 700 tons sugar. This quantity is removed as soon as bagged to Port Douglas, from whence it is shipped to Cairns.

Varieties.

Many varieties are raised. The more important are mentioned below. The area truly cannot be classified as being a Badila-growing one, yet more might be successfully grown. H.Q. 426 is highly favoured and one difficult to replace. Less D. 1135 and B. 147 might be grown and the planting of more Q. 813, Oramboo, Korpi, and possibly E.K. 28. H.Q. 285 has been recommended in my previous reports as being a kind suitable for this area. E.K. 28 requires studying, especially the time of planting and its cutting. Great disappointment prevails here because of the exceptionally poor strike. Too early planting, too much soil covering, and apparently poor seed used may have been responsible for its great failure. Many a promising variety has been lost to the industry because its little peculiarities were not understood. Try Pompey in the poorest of soil in a small way first of all; it should do better here than further south.

This district is much troubled with Leaf Stripe disease. Do not plant any more Goru at Mossman; that seen is badly diseased with Leaf Scald.

Cultivation.

Field work is decidedly better. There, however, is still much room for improvement. Farmers generally devote more time to cultivating the plant part of the crop, but too frequently neglect the ratoons. Fields that had been harvested some six or eight weeks back had not been worked since. The lack of timely cultivation is responsible for loss of soil moisture and poorer crops. When the cane is cut, most of the old roots perish, then is the time to ratoon; if delayed, the new roots are severed and the crop growth naturally is retarded.

Ratooning.

The common practice is to plough away from the cane row and the rough sometimes levelled by a roller. When overmuch rain falls the left side channels drain the excess water. In a dry time the whole field should be levelled; this considerably reduces the surface area exposed.

Diseases and Pests.

The wide distribution of diseases and pests is the result of uncontrolled district importations which have and are still taking place, but to a lesser degree.

Leaf Stripe is the main disease, and is found mainly in B. 147, D. 1135, and to a lesser degree in H.Q. 426 and Badila. To control this disease I can only recommend the following:—

(*a*) Better plant selection.
(*b*) Dig out affected stools in less-infected areas.
(*c*) Plough out severely diseased fields as soon as possible.
(*d*) Important—See that none of the old stubble remains prior to planting.
(*e*) Rotation. Plant with leguminous crop after ploughing out.
(*f*) Plant with a resistant variety change.
(*g*) Do not use tops from diseased fields for feed purposes.

Leaf Scald was noted on many fields. Army worms and similar moth borers to those found at Babinda were noted. Grub and rat destruction was great in parts.

MOWBRAY AREA.

Land of quality is found adjacent to the river and lesser creeks which water and drain it. Badila is the cane generally grown. Unfortunately, the spot is rather a dry one, and the crops raised, although excellent in quality, are backward. Good water, it is said, is easily obtained. This being so, irrigation might be successfully conducted. The cane seen appeared disease-free.

The Southern Field Assistant, Mr. J. C. Murray, reports on the period from 10th September to 12th October:—

BUNDABERG.

In the course of the month work was carried out in the Bundaberg and Nambour districts. Control work in connection with Fiji disease was also done. The canegrowers in the counties of Canning, Ward, March, and Stanley are reminded that no plants may be transferred from one farm to another without the permission of an inspector under the Diseases in Plants Act. Growers requiring permits are requested to get in touch with the Director, Bureau of Sugar Experiment Stations, Brisbane.

Farming Efficiency.

The crushing at Bundaberg was in full swing, with a tonnage per acre slightly in excess of what was estimated at the beginning of the season. The c.c.s. content of the cane is fairly high. A good class of labour is available, guided by a staff of efficient and well-trained industrial leaders.

Much has been said of late about efficiency. While the highest standard of efficiency in our cane industry is desirable, it is also necessary to know what constitutes efficiency, before using the term in a general sense. Many men in selecting an institution as an example of efficiency, or otherwise, really could not explain themselves if they were asked to give logical details in support of their statements.

In the particular phase of efficiency that it is desirable here to discuss—farming efficiency—much depends in endeavouring to obtain the maximum on the financial status of the farmer. The average canegrower is an intelligent man who is keen on regarding his industry as a highly organised business, but in too many instances he is in the struggle to make ends meet, handicapped by lack of capital. He may, superficially, appear to draw away from the breadline, but the financial institution and credit-extending business could tell a different tale.

Leaving the matter of potential efficiency, the details that contribute to better results will be discussed in their relation to the Bundaberg district.

Ploughing.

In the area under review this section of field work is being done thoroughly and scientifically. Tractors and modern ploughs are in use, also subsoilers and rotary cultivators. Extensive subsoiling is done when there is strong tractor power.

Planting.

Various types of planters are in use, the smaller growers using the horse implements, while the plantations are using double drillers and planters. The cane is being planted on an average of 8 inches deep with about 3 inches of covering. The writer is of the opinion that the average grower covers his plants too much. Nearly everywhere this spring there can be observed farmers relieving their sets. It is one distinct drawback in regard to the planting implement that the amount of covering cannot be controlled. Rain or shine, the same heavy covering goes on. This does not matter greatly in the porous red soils, but it is very important to study the amount of covering in badly drained lands.

Plant Selection.

Everything a grower does goes for nothing if he cannot obtain good plants. Often a grower, through oversight or lack of conviction, allows affected or poor plants to go to his soil.

It must be borne in mind by every grower that diseases such as Mosaic, Gumming, and Fiji are a serious menace to the industry if not controlled, and it is only by collective effort that they can be kept in check, and the sooner the farmer who pooh-poohs the likelihood of disease decimating his crop realises his foolishness the better. The soundest recommendations that the whole field of science can furnish have been presented to the Queensland sugar-growers from time to time on disease control, and it is in their own interests to apply those recommendations.

Fertilisation.

The matter of obtaining correctly balanced fertilisers is receiving careful attention by the growers as a body. Many are trying local experiments, and all farmers are urged to make trials. What might be termed decentralisation of experiment is all-important in manuring the soil; that is to say that Mr. A., of Oakwood, may obtain results extremely satisfactory to himself, but that they would be of no use to Mr. B, half a mile away at Gooburrum, nor perhaps to the immediate neighbour of A.

Varieties.

In planting, great care must be taken to select a variety that is proving of the maximum value. In the Woongarra area a great deal of trouble and loss is being caused through gumming disease (*Bacterium vascularum*). Careful study of this serious cane malady has shown that it is caused by growths of microbes within the fibres. It has also been demonstrated that certain canes are more resistant than others to this disease. The most resistant cane to gumming disease at present is the Q. 813. This cane is well known and easily obtained, and although, perhaps, on some soils this cane will not do well, the fact remains that it will produce, on the whole, gum-free canes; therefore the farmers are recommended to grow Q. 813, and the cane inspectors and plantation managers are respectfully asked to assist the Bureau Staff in this recommendation. N.G. 16, N.G. 15, M. 1900 Seedling, and D. 1135 should be left alone for a time, or most carefully selected from areas right outside the Bundaberg district. The attention of canegrowers is drawn to the thorough and careful considerations of Mr. D. S. North, Plant Pathologist to the C.S.R. Company, on gumming disease.

NAMBOUR.

The heavy rains that fell early in the year were followed by a very dry spell, then a succession of winter frosts, and upon the heels of the frost about 6 inches of rain. It can be observed then that the year has not been favourable for the growth of crops. Nevertheless the c.c.s. value of the cane is high, and the mill management reports no set-backs from gummed cane. The latter highly satisfactory state can probably be attributed to two causes—(1) extensive planting of Q. 813 and (2) more careful plant selection.

The cane that has just been planted is going to have a slow time owing to the abnormally heavy rain soaking the soil, but it appears to be germinating well, as a careful survey of several planted areas showed.

The Southern Field Officer, Mr. J. C. Murray, reports for the period 14th October to 12th November:—

NAMBOUR.

The last report on field work was written from Nambour. A complete survey of the district had not been made at the time, so that it will be necessary to set down notes made after writing the last report.

Every effort is being made to encourage the growers to make local experiments with varieties and manures. If each farmer could make a small experiment plot on his farm, devoting, say, an acre to the work, he would find that the information gained in relation to fertilising alone would pay him over and over again for his trouble. Each crop taken from the land does away with some of the plant food in the soil. How to feed that soil properly and prevent complete wastage can only be determined by local experiment.

The following are details noted in the sub-areas:—

Coolum.

Cane varieties growing here include Q. 813, Q. 970, Q. 1098, D. 1135, and N.G. 15. The farmers generally consider that the first-named is the best of these. As is well known in the Coolum area, drainage is the most serious problem facing the growers. The writer understands there is a comprehensive scheme afoot at the present time for the purpose of effectively draining the Coolum farms, and if this is brought to maturity then some fine canegrowing land will be at the disposal of the farmers, who, up till now, have had an up-hill fight in this particular district.

Maroochy River.

Many of the agricultural troubles encountered this year have been caused by unfavourable weather early in the year. However, good tillage has greatly improved matters, and just at present the young plant and ratoon crops look well.

The principal enemy the farmers in this area have to combat is the ever-present gumming disease. It is almost impossible to completely rid the canefields of this serious menace, but by growing resistant varieties and carefully selecting plants the malady may be prevented from doing serious damage. Farmers looking for information on gumming disease (and they always should be) are asked to write to the Director of Sugar Experiment Stations, or ask the visiting officer as many questions as they can think of.

When the writer was on the Maroochy River, two years ago, at a field day held there in connection with gumming disease, he recommended the farmers to plant Q. 813 and try as extensively as possible H. 227. This recommendation is repeated here. The first-named variety proved its resistance to gum and the latter is also showing resistance to a fair degree.

The resistant variety of all the matters named in connection with disease control is the best, and the position in disease-affected areas will keep getting worse and worse if farmers keep on casually planting Badila, D. 1135, and M. 1900 Seedling.

Great progress has been made on the Maroochy River over the last eight years. New farms have been made where tea-tree swamps were previously, nice homes have been built, roads improved, and tramways extended. The farmers have not really made any money, but they have faith in their district and the measure of comfort is due to careful ways and hard toil.

MARY VALLEY.

Fairly heavy crops have been grown here this year, although the c.c.s. value has, on the whole, been low. Taking this and long haulage into consideration the growers have not done very well.

Varieties growing are Q. 813, M. 1900, D. 1135, and Badila. H.Q. 285 is also making good growth. Farmers are recommended to grow principally Q. 813 and H.Q. 285. The cane in this district is healthy and free from disease on the whole.

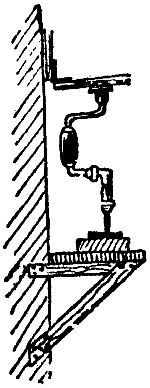
Growers here are reminded that at Bundaberg Sugar Experiment Station they can have tests made of their cane as a guide to maturity only.

BUNDABERG.

Conditions here could be summarised as under:—Germination: Fair; misses due to diseased plants and unfavourable soil conditions. Weed growth: Heavy, though not out of hand. Fertilising: Methods more satisfactory; more local experiment being undertaken. Cane vareties: Position serious through the majority being very susceptible to gumming. Diseases: Gum (*Bacterium vascularum*) very bad.

A TEMPORARY DRILL.

Recently it was necessary to drill holes in metal hinges with long flanges. To do this with only a hand brace and bit is a difficult job, as the drill required considerable pressure to make it bite. The device illustrated was fixed to a post, and acted very well. A board was nailed to the post with a hinged arm, while below at the right height was a bracket to carry a small table or shelf. The leverage obtained was sufficient to drill holes easily.



ROOT KNOT OR NEMATODE ROOT GALL.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

Nematodes or eelworms belonging to the species *Heterodera radicicola* are responsible for the development of the peculiar malformations occurring in root knot or nematode root gall. These extremely minute animals are found in enormous numbers in the soil in many districts in this State, and records of their destructive activities have been obtained from centres as far apart as Cairns and Coolangatta. The list of economic and other plants attacked by them is a very formidable one, and their presence in the root system is frequently associated with disastrous consequences to the plants attacked. It therefore seems desirable to give a brief account of these destructive organisms and to indicate lines along which some measure of relief may be obtained.

Appearance of Infested Plants.

An examination of the root system of infested plants usually yields ample and conclusive evidence of the presence of the parasitic organism. The typical feature in an attack by this species of nematode is the occurrence of extremely swollen or distended areas (Plate 147, Figs. 1 and 2; Plate 148, Figs. 1 and 3) at various points throughout the root system. The swellings or enlargements may be found occurring singly and at considerable intervals on the roots, or, on the other hand, they may be so close to each other as to give practically the whole of the root system a most peculiar and abnormally thickened appearance. These typical swellings are produced as a reaction to the irritation set up by the activities of the nematodes in the root tissue.

It is well to point out at this stage that, in the Leguminosæ or pea and bean family, certain beneficial root nodules are produced by a totally different organism. These nodules result from the presence of the nitrogen-fixing bacteria that are found in association with the root system of the Leguminosæ, and they must be regarded as being entirely beneficial. The root knots or nematode root galls on the other hand are frequently very detrimental to the welfare of the attacked plants.

The beneficial bacterial nodules may be distinguished by the fact that they are generally small or moderate-sized spherical bodies, which can usually be readily broken off from the sides of the rootlets on which they are found (Plate 148, Fig. 4). The root knots or nematode root galls, on the other hand, are swellings in the roots themselves and they are not readily detached therefrom. The difference in appearance between bacterial nodules and the nematode-induced root knots or galls is well indicated in Figs. 1, 3, and 4, Plate 148).

The roots are not invariably the only portion of the plant attacked, because in the case of the ordinary potato the tubers or potatoes are often infested, the whole surface not infrequently being covered with a

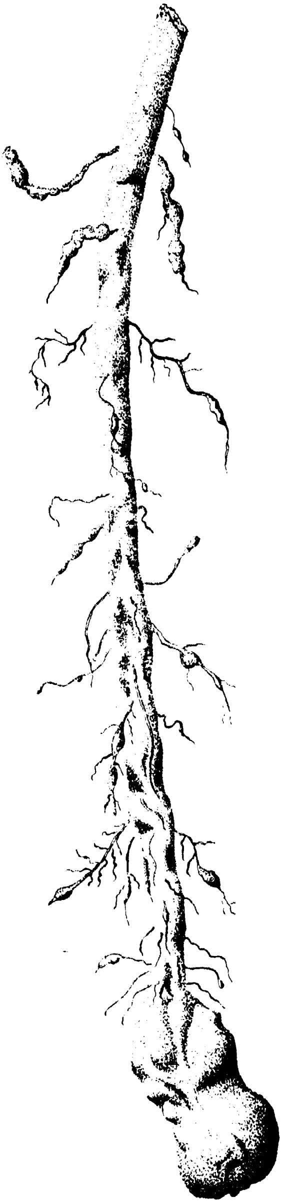


FIG 1

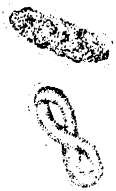


FIG 3 × 150

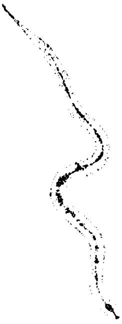


FIG 4 × 150

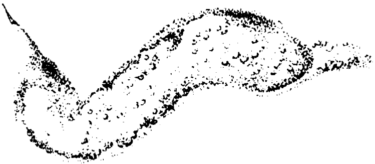


FIG 5 × 150

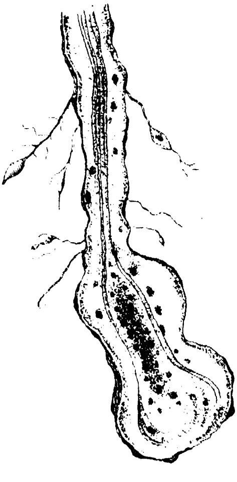


FIG 2

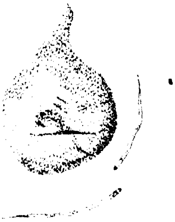


FIG 6 × 30

PLATE 147.

Fig. 1.—Infested Banana root.
Fig. 2.—Longitudinal section of Banana root showing Nematode infestation.
Fig. 3.—Eggs in different stages of development.
Fig. 4.—Larva.
Fig. 5.—Female.
Fig. 6.—Female (later stage).

series of swellings which give to the potato a characteristic "pimply" appearance (Plate 148, Fig. 2). In addition to the attack on the tubers the roots of the potato may be infested just as in other plants.

Effect on Infested Plants.

The effect that is produced by root-knot infestation varies very materially. Many of the species of plants included in the category of those that are attacked show but little evidence of the infestation in their roots, and, indeed, they appear to suffer little or no injury from the presence of the parasite. Other species of plants frequently show very considerable numbers of root galls on the roots, but, even so, in their case there is no definite evidence of serious damage arising therefrom. The third class is the most important for present purposes, for the species of plants included therein are subject to heavy infestations associated with very severe losses.

The galls that occur in the roots of infested plants belonging to these highly susceptible species disorganise the normal functions of the root system, and, as a consequence, there is very serious interference with the flow of soil moisture absorbed by the delicate roots for transference to the leaves and stalks. Very appreciable dwarfing, in the case of susceptible and severely attacked plants, is associated with that disorganisation in the transport of the raw materials required for the building up of plant tissue. Moreover, during hot dry spells such plants wilt much more readily than those that are uninfested. Infested plants of susceptible species are also generally paler in colour than those that have escaped attack, and they have a somewhat sickly yellowish appearance.

Where infestation is heavy and general conditions are favourable to the parasite, the death of the plant may occur much earlier than would normally be the case. The early collapse of the plant may be due entirely to the nematode infestation, but cognisance must also be taken of another factor—namely, the ease with which fungus or bacterial diseases can gain an entrance through the ruptured root tissues. These diseases may be the actual cause of the death of the plant or they may be merely a minor contributory factor.

Extent of Losses.

It would be very difficult indeed to give any estimate of the losses due to the presence of nematode root-gall infestation in Queensland. Local observations suggest that serious reductions in yield have followed in its wake, but no figures are available to indicate just how heavy these losses have been. Elsewhere, however, losses were estimated in some cases, and it is interesting to quote from these estimates. They indicated a loss of 20 per cent. in beans, 12 per cent. in potatoes, 25 per cent. in peas, 13 per cent. in tomatoes, and about 4 per cent. in cotton. Even a loss of 4 per cent. in a highly important crop such as cotton represents a tremendous wastage if it is a figure that is applicable in most cotton-growing countries and does not represent an abnormally high loss peculiar to the country in which the estimates were made.

Organism Responsible for Root Knot.

As already indicated, the malformations characteristic of root knot or nematode root gall are not due to insect attack, but are the direct result of the infestation of the root tissue by a very small eelworm.

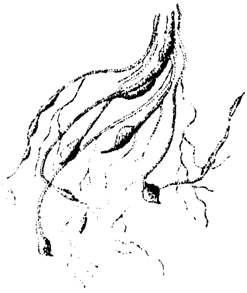


Fig. 1.

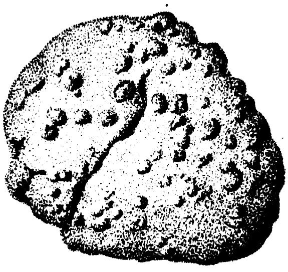


Fig 2

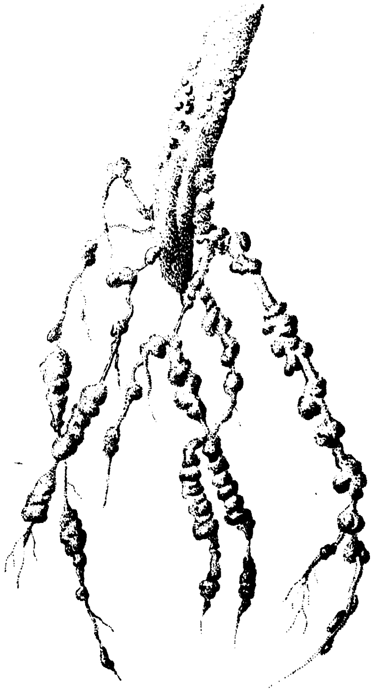


Fig. 3.

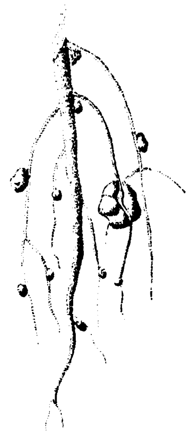


Fig. 4.

I. W. Helmsing 1927.

Plate 148.

Fig. 1.—Nematode galls on Strawberry roots.
Fig. 2.—Nematode infested Potato.
Fig. 3.—Tomato root infested by Nematodes.
Fig. 4.—Bacterial Nodules on roots of Lupin.

(All ½ natural size).

Eelworms belong to the group of animals called nematodes because of their thread-like appearance. Some of these eelworms are parasitic on plants, others attack animals, including man himself, while still others are predaceous on individuals belonging to their own group—i.e., other eelworms. The species associated with root knot is *Heterodera radicicola*, a nematode that has a very wide distribution throughout the world.

Life History of the Root Knot Nematode.

The life history of this species has been worked out in detail elsewhere, but for present purposes the following brief outline is sufficient. The usual male and female sexes occur and the female is credited with the capacity to lay as many as 500 eggs. The eggs are provided with a tough shell, which serves to protect them against adverse conditions that may occur in the soil. They are extremely minute, being not quite $\frac{1}{250}$ inch in length.

After the usual incubation period, the eggs hatch and an extremely small thread-like animal emerges. This is the larval stage, and at its commencement the eelworm is about four times as long as the egg from which it hatched. The young larval eelworm moves about freely in the soil until it finds a susceptible plant; having succeeded in doing so, it enters one of the roots, generally choosing a spot near the tip of a young feeding root. A spear-like organ inside the mouth is then used for the purpose of feeding on the fluid contents of the tissue of the root entered by the nematode, and as a reaction to its presence the characteristic swellings are produced at the spot invaded.

In the case of the female eelworm growth is in breadth rather than in length, and eventually the female becomes a pear-shaped or flask-shaped body, which can be detected without the aid of a lens when the infested tissue is broken open and examined. The female nematode is then about $\frac{1}{50}$ inch in breadth and is a somewhat glistening pear-shaped object. The male also feeds in the root tissue, but it does not attain the flask-shaped form of the female; on the contrary, it remains long and worm-like. The various stages in eelworm development are illustrated in Plate 147, Figs. 3, 4, 5, and 6.

Figures are not available to indicate how many generations are passed through in Queensland in the course of twelve months, but, as twelve generations are possible in the Southern United States, there is every reason to believe that in Queensland at least a similar number of generations would be obtained.

Conditions Favouring Infestation.

Nematode infestation is generally at its maximum in light sandy soils in semi-tropical or tropical regions. The relatively slight variations occurring in the temperature in such areas permit of almost uninterrupted development, and the texture of the soils in question is also highly conducive to the excessive multiplication of soil-infesting nematodes.

Heavy soils are generally much less susceptible to infestation, probably on account of the difficulty experienced by the nematodes in moving from plant to plant in such soils. Where soils are subjected to repeated flooding and are normally very wet, infestation is slight; on the other hand, if the soil is abnormally dry, infestation is also unimportant.

Means of Dissemination.

It is generally believed that the larval nematodes move through the soil at the rate of only a few feet each year. Such being the case, there must be some means of dissemination other than the mere haphazard wandering of the larval nematodes in search of the roots of susceptible plants.

Seedlings or nursery stock infested with nematodes have frequently been the means of establishing the pest in areas previously free from its ravages. Seed potatoes have been similarly responsible for nematode dissemination, while manure containing portions of the roots of infested plants has also been a factor in their spread.

The rapid dissemination of this pest has been facilitated by the ordinary operations of cultivation, for implements used in infested paddocks can transfer the nematodes to uninfested paddocks through the agency of the soil adhering to their various parts. They may similarly be transported in the soil adhering to the boots of workers or to the hoofs of animals. Drainage, irrigation, or other running water may also serve as a means by which the parasite can be transported.

Susceptible Plants.

The number of species of plants recorded as being attacked by the root knot nematode is now extremely large and is frequently being added to. Many of the most important plants cultivated by man for his own sustenance are included in the category of susceptible plants, and mention must also be made of the fact that many weeds are attacked.

Asparagus, banana, bean, beet, carrot, celery, cotton, cucumber, fig, grape-vine, lettuce, onion, papaw, pea, peach, pineapple, potato, pumpkin, strawberry, sugar beet, sugar-cane, sweet potato, tomato, and watermelon may be mentioned as some of the more important plants subject to severe attack.

Plants Resistant to Attack.

Among the plants that are immune to attack or but slightly affected, mention may be made of barley, broom millet, four varieties of cowpea (Brabham, Iron, Monetta, and Victor), grasses (most), maize, peanut, sorghum, wheat, and velvet beans.

Control Measures.

It will be evident from what has already been written on this subject that the control of the root-knot nematode parasitic on economic plants must of necessity present a very difficult problem. Here the farmer, fruitgrower, or nurseryman is dealing with a parasite that is for most of its life-time entrenched within the living root tissues of the plant to be treated or protected. When not in the plant tissues it is free in the soil, where it frequently occurs in enormous numbers. Further complications are caused by the fact that there are many weeds on which it can exist even if the land is cleared of susceptible cultivated plants.

It may be definitely stated that the cure of infested plants is quite outside the bounds of practicability, and hence control should aim at eliminating or reducing the numbers of nematodes inhabiting the soil where land is already infested. Where it is uninfested, every effort should be made to mantain it in that happy condition.

Nursery stock or seedlings showing any symptoms of root knot should not be planted on uninfested lands, and, indeed, such stock or seedlings are undesirable for planting even on infested lands. Care should also be taken to avoid the use of infested seed potatoes. Mention has already been made of the possibility of infestation by implements, live stock, running water, &c., and accordingly all practicable precautions to eliminate such sources of infestation should be taken. If these precautions are observed, uninfested land may be kept free of this very serious pest.

The fact that quite a number of valuable crops are immune or highly resistant to attack has been used to reduce infestation by means of rotation; a rotation being adopted in which these immune crops feature prominently. The immune or resistant crops were referred to in an earlier paragraph, and consideration might be given to the growth of certain of these crops where it is desired to reduce nematode infestation in order to permit of the subsequent growth of susceptible crops. The actual crop selected for the rotation would, of course, depend on many factors that cannot be entered into in these notes.

Infested greenhouses or seed-beds can be treated by methods that would be much too expensive on a field scale, and in this connection mention may be made of the fact that steam sterilisation of the soil in greenhouses in regularly carried out in many large establishments throughout the world. In cases where sterilisation is desired but steam is not available, much good may be effected by treating pots or other containers and their soil contents with boiling water at the rate of five gallons per cubic foot. After treatment, several days should be allowed to elapse before planting, in order to permit of the soil draining in a thoroughly satisfactory manner.

Even where infestation is present, susceptible plants may sometimes be kept on quite a profitable basis by a judicious combination of thorough cultivation and heavy manuring.

During recent years much experimental work has been devoted to an endeavour to control nematodes on a field scale by soil fumigation. However, so far as Queensland conditions are concerned no data are yet available to show that such is both economically practicable and effective.

AN INTERESTED READER.

An old Coolabunia subscriber, now settled at Mulgeldie, in the Upper Burnett, writes:—" . . . I am very interested in the 'Queensland Agricultural Jounal,' for it is the best periodical for the farmer . . . . and I am willing to continue getting it as long as I can read. . . ."

The Columbia Portable Viva-Tonal Grafonola

that challenges the World at any Price!

Never such Tone,
Never such Value,
£9 9 0

The New COLUMBIA Portable at £9 9s. challenges comparison with any other portable AT ANY PRICE. The fullest test will show it to be far and away superior in Tone and Value. It is beyond question the finest portable Grafonola yet made. Enormous production alone has rendered such a reduced price possible. British throughout in every component part, its workmanship is of the highest possible standard, and its reproduction of records amazing in its beauty and volume. You are invited to hear and test it for yourself.

* * *

Columbia Portable "Junior"

(No. 109) £6 6s. 0d.

A "Junior" Model Columbia Portable that represents another amazing standard in Value—no other portable Talking Machine offering such Tone or Quality at anything like this price. Shaped like an attaché case, and fitted with Carrier to take Eight 10-inch records.

PUT IT IN YOUR CAR.

Easy Terms. Catalogues free

Palings

Established 1853.

BRISBANE
TOOWOOMBA
ROCKHAMPTON
TOWNSVILLE

INVEST *Nature will multiply the dividends for you*

Invest in growing timber. As the forest trees grow and develop your wealth will increase—ultimately returning a handsome dividend. Here is an investment with an insistent appeal to those who have the courage to look ahead. As an endowment for yourself or your family—to provide for the future of your children—to lay the foundation of a business career for your son or daughter—no other secured investment issued to the public offers such a splendid return.

Become a Bondholder in N.Z. Perpetual Forests Ltd.

Act now—learn all the advantages which this unique opportunity offers—then become a Bondholder entitled to the benefits which must accrue. A policy of delay will put back the harvest time—if delay develops into chronic inaction it will preclude you from sharing in this handsome investment. For your own sake—for the sake of your children—INVEST NOW.

N.Z. Perpetual Forests Ltd.

Send for particulars to the Managers and Brokers

Smith, Wylie & Co. Ltd., Griffiths House, Brisbane

Name..........

Address.......... Q.A.J.

BRUNNING

BEST FOR BEARING

FRUIT TREES

(True to Name and Healthy)

are planted throughout Australasia. Apples, Pears, Plums, Peaches, Nectarines, Quinces, Mulberries, Oranges, Lemons, etc.

Shipments made to all Parts of the World.

JOHN BRUNNING & SONS

Established 60 Years

SOMERVILLE NURSERIES

SOMERVILLE, VICTORIA, AUSTRALIA

Chicks-Chicks-Chicks

Day-old Utility

Black Orpington and White Leghorns

From World's record laying strain. We are now booking orders for delivery from June to October. £5 per hundred, £2 10s. for fifty, 15s. per dozen; special quote for larger quantities. 10s. per 100 secures booking, freight paid. Instructions for feeding, etc., supplied with every order. Also settings 7s. 6d. Stock for sale. *Square deal guaranteed. Correspondence invited.*

Woodlands Poultry Farm

Beerwah, Queensland

THE CORN EAR WORM ON TOMATOES.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

The insect known as the corn ear worm (*Heliothis obsoleta* Fabr.) is an extremely serious pest of many economic plants, but, as its popular name implies, it has gained particular notoriety as an enemy of corn or maize. It is one of the most destructive insects associated with cotton in Queensland, and it is also undoubtedly the worst insect pest of the tomato in this State. When associated with the lastmentioned plant it is generally referred to as the tomato caterpillar or "worm." For present purposes attention will be devoted solely to its activities as a pest of the tomato.

The corn ear worm is notorious not only on account of its very wide range of food plants but also because of the fact that it has been found to occur in many different countries, and is, in fact, practically cosmopolitan. It belongs to the family of moths known as the Noctuidæ, and is therefore allied to the very destructive species commonly referred to as cutworms and army worms.

Life-cycle Stages.

(*See Plate facing p. 591 in "Cotton Growing in Queensland," Part II., this issue.*)

The various changes through which this insect passes to maturity are typical of all moths, there being four very distinct and easily recognisable stages in its development—(1) egg, (2) larva or caterpillar, (3) pupa or chrysalis, (4) imago or adult or moth.

The eggs (Plate I., Fig. 1) when just laid are pearly-white in colour, but as the incubation period advances they darken very appreciably. Their shape somewhat resembles that of a dome, and in size they are about equivalent to that of half an ordinary pinhead.

The larvæ (Plate I., Fig. 2) are whitish when newly emerged from the eggs, but their colour soon changes, and in full-grown specimens it varies very greatly, some being pale-green, whereas others are dark-brown. A number of longitudinal stripes of different shades usually play a part in the formation of the colour scheme. The larvæ have three pairs of jointed legs on the thoracic segments and five pairs of unjointed abdominal and caudal legs; when full grown they measure about 1½ in. in length.

The pupæ (Plate I., Fig. 3) are of the usual lepidopterous type, being brown in colour and measuring about ¾ in. in length.

The moths or imagines (Plate I., Fig. 4) possess two pairs of wings, giving a maximum wing expanse of about 1½ in. The colour pattern is sufficiently detailed in the accompanying plate (Plate I., Fig. 4), and hence a written description thereof is unnecessary.

Life History and Habits.

The female moth, after mating, generally lays her eggs singly on the flowers, flower buds, or on the young foliage, thus ensuring that the larvæ, on emergence, will have an abundant supply of suitable food close at hand. Eggs may, however, be laid on other parts of the plant.

The number of eggs laid is generally regarded as being in the vicinity of 1,000, although as many as 3,000 have been recorded. Egg-laying is spread over a number of nights. The incubation period of

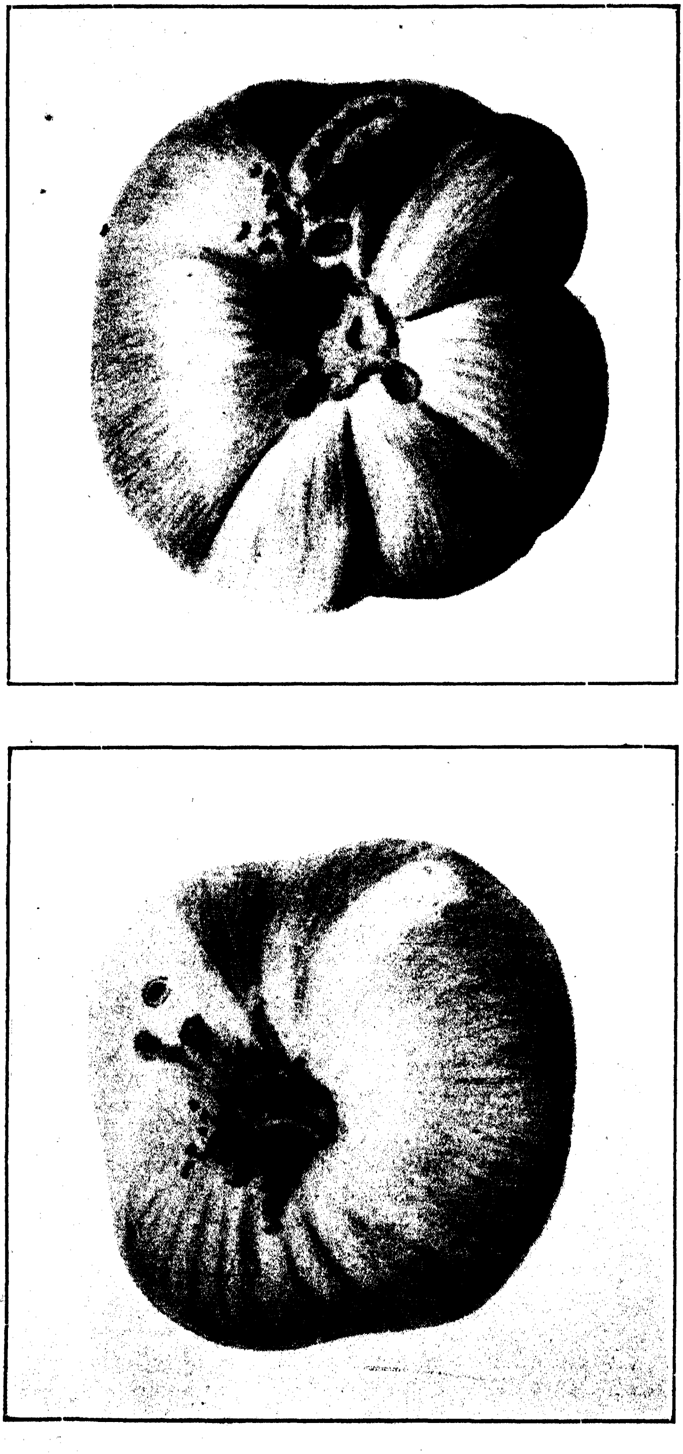


Plate 149.—Tomatoes Attacked by Corn Ear Worm Larvae.
(*From water-colour drawing by I. W. Helmsing.*)

the eggs in the summer months is about three days, but in spring time six days or even longer may be spent in the egg stage.

The newly-emerged caterpillars eat the eggshells and then turn their attention to the flowers, foliage, or fruit of the plants on which they occur. The caterpillars may continue feeding on the foliage, but usually they make for the green fruit. The most destructive feature of their feeding activities is the attack on the fruit, which they enter at the calyx end (Plate 149). Each fruit within which a larva is feeding is rendered useless, and as the larva attacks fruit after fruit, each individual is capable of destroying a considerable quantity of tomatoes in the course of its short larval life. The injury in cases where the larva does not feed within the fruit is much less serious, and the tomatoes so attacked are not necessarily rendered useless. In bad outbreaks 50 per cent. or more of the fruit may be destroyed, and, unfortunately, infestation is not confined to the coast, for losses also occur in the Stanthorpe district. The caterpillars grow rapidly, and moult six times before becoming full grown. Full size is attained in two or three weeks, and then the insect passes on to the third stage in its life-cycle—namely, the pupa.

The full-grown caterpillar drops to the ground and burrows into the soil to a depth of a few inches. It then forms a small earthen cell inside which it changes to the pupa. In the pupal stage a tremendous transformation takes place, and a complete reorganisation of the body-contents results in the production of the moth or reproductive stage of the insect. The pupal stage generally occupies ten days or a fortnight in the warmer weather, but in cold weather the time necessary for the completion of that portion of the life-cycle may be greatly prolonged. No feeding takes place in the pupal stage.

At the end of the pupal stage the moth emerges from the earthen pupal cell and works its way out of the soil through a channel constructed by the larva prior to pupation. It then mates, lays eggs, and so the life-cycle is continued. The moth is generally considered to live for a period of about two weeks. It is nocturnal in its habits, but may occasionally be seen in the day time. It feeds on the honey of flowers, and is in itself responsible for no damage to tomatoes. The whole life-cycle from the laying of the egg to the emergence of the moth occupies from four to six weeks for the spring and summer generations in Queensland.

Natural Enemies.

Quite a number of natural enemies attack the corn ear worm, but, unfortunately, they do not exert their maximum influence until summer is well advanced, and, accordingly, the tomato-grower cannot depend on them for complete control. He must, therefore, supplement the natural control factors by artificial control measures.

The eggs are attacked by three very small wasps, *Trichogramma australicum*, *Trichogramma rara*, and *Neotelconomus* sp. A small bug, *Triphleps australis*, also does good work by sucking the contents of the eggs and thus destroying them.

The larvæ are parasitized by four enemies, and two predatory wasps also serve to reduce their numbers.

Insectivorous birds, adverse weather conditions, and diseases also play a part in reducing the corn ear worm population.

Control Measures.

The fact that this pest has a wide range of plants on which it can complete its development suggests that, as one control measure, attention should be paid to other host plants growing in the vicinity of the tomatoes. If these alternative host plants are grown neither for profit nor for domestic use, and are neglected, they will serve merely as excellent breeding-grounds for the pest. They should therefore be destroyed. Should they be grown either for home consumption or for marketing, then they should be subject to suitable control measures that will keep them free from the corn ear worm. Included in the alternative host plants are maize, cotton, lucerne, tobacco, cowpea, bean, pea, cape gooseberry, and rosella.

Tomatoes that have been attacked by this pest should be collected and disposed of by deep burying or by boiling, or by any other suitable measure that will serve to destroy the caterpillars associated with them. In this way a check may be placed on the unduly large multiplication of the later generations.

Rotation is another important measure that may afford some relief from infestation, and if it is practicable to do so it is well to plant tomatoes after a crop that is not susceptible to attack by the corn ear worm. If that is done the tomatoes will get a cleaner start than would otherwise be the case.

Thorough cultivation in preparation for planting up will lead to the destruction of many of the larvæ and pupæ of this pest either by direct mechanical injury or by the exposure of these stages to adverse climatic conditions, and to the attacks of predatory enemies such as birds.

Spraying or dusting with arsenate of lead is regularly practised in many districts in Queensland for the control of the corn ear worm on tomatoes, and much benefit is usually derived from this control measure. The crop must be treated several times at somewhat frequent intervals, the applications commencing not later than the date at which the first fruit appears. Careful observations leading to the detection of heavy egg-laying by the moths will frequently indicate the most appropriate times at which to spray or dust.

Dusting is carried out with a dust gun, and is dependent on suitable atmospheric conditions for success. It should be attempted only when there is little or no wind blowing, and is best undertaken when the dew is still on the plants early in the day. Various brands of dusts are on the market, and some of these have been specially prepared for application to tomatoes. Fruit that has been sprayed or dusted should be cleaned before packing.

SHOULD BE IN EVERY PRODUCER'S HOME.

Thus a Pechey (Crow's Nest Line) farmer when renewing his Journal subscription for five years:—"I might add that I find the Journal of great value to me, and I cannot understand why it is not to be found in every primary producer's home."

COTTON GROWING IN QUEENSLAND.

PART II.

Pests of Cotton in Queensland.

A Bulletin for farmers giving an account of the Insect Pests of Cotton and their habits, and some measures for controlling them.

By

E. BALLARD, B.A., F.E.S.

Commonwealth Cotton Entomologist.

FOREWORD.

In publishing this short account of the chief cotton pests of Queensland, the author is conscious that there are many shortcomings, notably in the direction of remedies for controlling the insects which levy their toll year by year.

The pests of cotton in most cotton-growing countries follow very much the same lines, and in other lands remedies have been used which might be applicable to Queensland, on the other hand they might not.

Where any definite remedy is recommended in the following pages, the cotton-grower may rest assured that it has been tried under Queensland conditions and found to be successful and economical enough to be used.

The Corn Ear Worm commits the most spectacular damage, and in the case of this insect the forms of control have been proved on too many occasions for their efficacy to be doubted.

If in the case of some of the other pests remedies are for the moment lacking, it is an advantage to know who one's enemy is even when one cannot at the moment defeat him.

It is hoped that the cotton farmers will take the trouble to acquaint themselves with the insects that live on and in their cotton, so that in the first place they may be able to take attacks at the beginning and so more easily combat them, and secondly they will avoid sleepless nights caused by the appearance of some perfectly harmless insect.

A fruit farmer to be successful has to be something of an entomologist, and the cotton farmer should follow his example.

It would be easy to give many instances of innocent insects accused of damage and dangerous ones given unblemished characters, but it is hoped that this bulletin will help to make it increasingly difficult for the guilty to escape.

INTRODUCTORY.

The problems attending the production of a crop of cotton cannot be separated from those arising from the activities of insect pests, and the measures to be taken to avoid losses are as much a part of good farming as the proper preparation of a seed-bed or cultivation of the growing plants.

Next to a sufficient rainfall and suitable soil, insects play the chief part in deciding whether a farmer will harvest a crop of cotton or not.

This does not mean that Queensland suffers more from insect pests than other cotton-growing countries. It must be realised, however, that insects are a constant menace and precaution must be taken to defeat them.

Large numbers of different species of insects take their toll of the cotton plant. Some attack the stem, some the leaves, some the bolls and squares. Fortunately the great majority make little or no impression on the crop and can be disregarded. Certainly, except in special cases, it is not an economic proposition to use insecticides against them.

Of those which are of importance some only occur sporadically, others are of annual occurrence.

An outline of the life histories of these is given below as it is essential to know something about them before the measures which should be taken against them can be understood.

MAJOR PESTS OF COTTON.

(A) Pests of Annual Occurrence.

These pests are confined to those which attack the bolls (and the seeds therein), squares, and flowers, or all three. They are, further, either caterpillars, or grubs as they are more usually termed locally, or sucking insects.

Of the former the most important is—

THE CORN EAR WORM.[3]

(Plate I.)

This insect is by no means peculiar to Australia, being found all over the world, and often though not always as a pest of cotton, as it has a very large number of other food plants.

The Corn Ear Worm, in the form in which it is most familiar to the farmer who sees it eating off squares and boring into bolls, is about

---

[3] *Heliothis obsoleta* Fab. Known to some farmers as the Maize Grub. It has been decided to adopt the American common name so as to avoid confusion with *Conogethes punctiferalis.*

Fig. 1

Egg × [illegible]

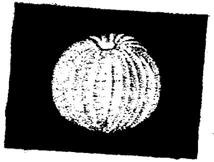
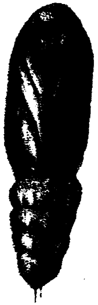


Fig. 3

Pupa × 1



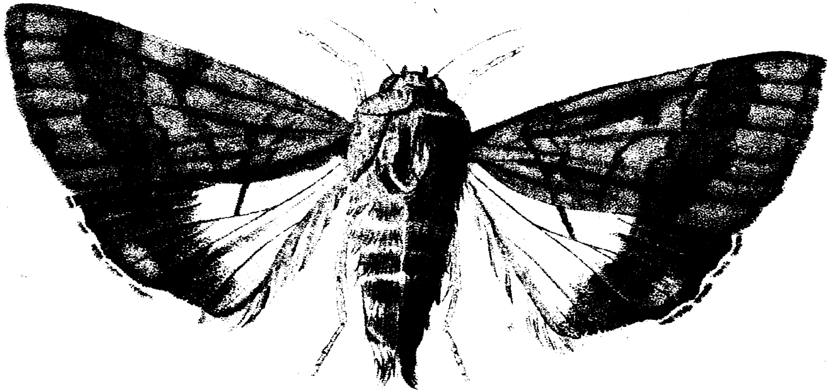
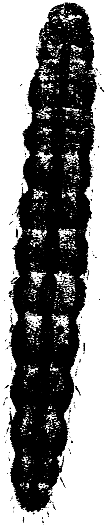


Fig. 2

Larva × [illegible]



I. W. Helmsing. 1926.

1¼ in. in length and of variable colouring—green, green with longitudinal stripes of a paler green, sometimes brown, sometimes a dark green and black. The colour schemes are numerous. It is often stated that it attacks a crop suddenly, overnight as it were.

Although it will sometimes migrate, such sudden appearances very seldom occur. What actually happens is that the grubs pass unnoticed until the peak of their attack is reached and the worst damage done.

LIFE HISTORY.

The life history of the grub is briefly as follows:—

The parent is a moth (Plate I., Fig. 4) with greenish grey or yellowish fore wings measuring 1¼ in. across the outstretched wings. The hind wings have a deep, dark-brown border. The female moth after pairing proceeds to lay her eggs one at a time on the cotton plant, only a few on each plant, always near the top. In this way the young larva is assured of tender food. The moth can lay up to 1,000 eggs. They are not all laid the same night, but egg-laying takes place in bursts spread over several days.

THE EGG.

(Plate I., Fig. 1.)

When first laid the eggs are small white objects, and once familiar with them they are very easily seen. After the first twenty-four hours the eggs begin to change colour, and just before hatching, which takes place in two and a-half to three days in the summer, they are orange yellow.

THE GRUB.

(Plate I., Fig. 2.)

From them emerge a tiny grub, which first eats the egg-shells and then wanders into the terminal bud and feeds on the young tender leaves. As they get older they attack the squares, which, being hollowed out, are shed.

This is the first symptom of Corn Ear Worm attack, which is often overlooked, the square-shedding being attributed to the weather or other causes. The grubs cast their skins six times (in the summer every two to three days), and after the sixth moult are ready for the next stage, the pupa.

PUPA.

(Plate I., Fig. 3.)

This stage is passed in the soil usually close to the plant. The grub drops to the ground and burrows down for about 1 in. to 1½ in., and there makes a small cell. Here it turns into a pupa (Fig. 3), and from nine to eighteen days after burrowing the moth emerges and begins laying (if a female) in some three or four days' time. So the whole cycle starts again—Egg, two and a-half to three days; grub, fourteen to twenty-one days; pupa, nine to eighteen days. The moth lives about fourteen days, laying most of the time. Life from egg to egg, twenty-nine and a-half to forty-two days for the summer and spring broods.

If each female lays an average of 500 eggs, and all hatch, and half are females, the descendants of one moth will reach 125,000 in under two months. Fortunately all eggs do not mature, for reasons to be given hereafter.

HABITS.

The grub, as has been stated above, starts feeding in the young leaves which are just unfolding. It soon starts on the squares and destroys numbers of them, not by eating them all, but by eating holes in them, sometimes smaller, sometimes larger.

Any damage to a square even if quite slight results in its being shed. If the cotton plant is engaged in putting on its first squares when the numbers of Corn Ear Worms are at their greatest, then the squares and flowers are eaten as fast as they are formed, and as a result the plant sets no or very few bolls, and puts on only vegetative growth. This is what very frequently happens in the case of late-planted cotton, and accounts for the big losses to cotton farmers in the 1923-24 season, when most of the cotton in the State was late-planted owing to the dry spring of 1923.

The maximum attack develops about the first week in January to the middle or end of February. After this time the attack begins to die off as the grub's natural enemies begin to make themselves felt, and with cooler weather the life cycle is prolonged. Behind the coastal ranges where frosts are experienced, and where the chief cotton-growing areas will be, May sees the last of the Corn Ear Worm as it descends into the soil and there passes the winter. Moths of the spring generation probably begin to emerge in September, but no large population is bred up until late December or the New Year. When grubs are in their fifth and sixth stages they often attack full-grown bolls, and from their habits of wandering do a good deal of damage in this way.

If they simply stayed in one boll and consumed it, it would not matter so much, but they often eat through one lock and then leave, and the damaged lock is attacked by moulds which may ruin the whole boll. This is never so serious as eating the early squares, because a damaged boll may still yield some cotton, while if squares are eaten as they appear the plant tends to put on only vegetative growth and no bolls are produced at all.

Early-planted cotton has set so many squares and bolls by the time the Corn Ear Worm population is large that it can afford to lose a lot of them. As many as 60 per cent. can be lost and still yield a profitable crop. The square formation always manages to keep ahead of the grub. So far as we know at present, the latest date for sowing which will enable the crop to escape serious damage from Corn Ear Worm seems to be the middle of October.

It might so happen that an early planted crop is an impossibility through failure of winter and spring rains. When this is the case, special precautions have to be taken.

REMEDIES.

These are of two kinds—firstly, by use of a trap crop, that is a crop more attractive to the Corn Ear Worm than cotton; and secondly, by the use of an insecticide.

Trap Crop.

The most effective is maize. As its name implies, Corn Ear Worm has a great liking for maize, preferring it and tomatoes almost to anything else, even when the maize is only 18 in. high.

The trap crop is so used that it keeps the majority of the Corn Ear Worms in the maize until the cotton has got a good start.

This system was applied on the Research Station at Biloela with great success in the 1925-26 season.

The maize was planted as follows:—For every sixty rows of cotton six rows of maize were sown at the same time as the cotton. Five or six weeks later four more rows, and five weeks later another four. The third planting was badly hit by a drought, and matured very late. In spite of this the first two plantings enabled us to harvest over 1,200 lb. of seed cotton to the acre.

On the same farm, where the second planting had not been done and the third was stunted (as it was all over the farm), the amount of cotton was so small as not to be worth picking, and thus 6 to 7 acres were lost.

The essential part of the trap crop idea is that the maize should be cut just before it ceases to be attractive to the moths as a place on which to lay their eggs—i.e., before the silk dries up. It is at this time full of grubs which are thus destroyed.

The cut maize can be put into a silo or fed to cattle. In either case thousands of grubs are prevented from completing their development, and the second sowing is growing up to catch those moths still on the wing or emerging from the soil after the first sowing of maize is cut.

It is most important to cut this first sowing; the second should be cut also, but can be left if time does not permit of its being cut. *The first should never be left standing.* If it is it simply acts as a breeding ground.

The cost of sowing, cultivating, and cutting a trap crop comes to 25s. 6d. per acre of maize, exclusive of charges for the farmer's time and cost of stacking in silo.

Natural Enemies.

The Corn Ear Worm is not allowed to have things all its own way, for it is preyed upon by a variety of enemies, and under certain climatic conditions it is killed by a bacterial disease.

It was stated above that all eggs do not hatch. Apart from those which are washed off the plants by heavy rain, others are sucked by a small bug,[4] and others again are parasitised by three minute parasitic wasps.[5] The grub itself is parasitised by four different species, and two predatory wasps also prey upon it. Altogether we have thirteen enemies of this insect, including the grub of an unidentified Carabid beetle. The full effect of these numerous enemies is not felt until towards the end of midsummer, so that, although they are a great help, the farmer has to supplement their attack with his own efforts.

The little egg-sucking bug is always abundant on maize, where it goes to feed on Aphis, but it is quite common on cotton also. In certain circumstances grubs attack and eat one another.

Control by Means of Insecticides.

Definite results from the use of insecticides have not yet been obtained.

Experiments designed for the 1926-27 season at Biloela were rendered negative firstly by the dry spring, and then by excessive rainfall, but are to be continued in the following season (1927-28).

The result of such tests as we were able to make shows that calcium arsenate dust applied at the rate of 15 lb. to the acre will stop an attack.

It seems that two applications when cotton is squaring (in January in a normal year), at a fortnight's interval, are all that will be required. The present price of calcium arsenate is 1s. 4d. per lb. in bulk.

SUMMARY.

(*a*) (i.) The Corn Ear Worm is a caterpillar which hatches from an egg laid by a moth on maize and cotton (and a number of other plants).

(ii.) It does most destruction to the cotton crop during January and February.

(iii.) On the cotton it feeds first in the tender leaves at the top of the plant and then eats squares, and bolls if present.

(iv.) It prefers maize to cotton.

(*b*) ***Protective Measures.***—(i.) If an early sowing of cotton is not possible, then, in the first week of November or at the time of planting, sow six rows of maize for every sixty rows of cotton. Five to six weeks later sow four rows of maize for every sixty rows of cotton. Five to six weeks later sow another four rows of maize for sixty rows of cotton. Cut first and second sowings when silk begins to dry (say seventy-five days from sowing). Never leave them standing after this time.

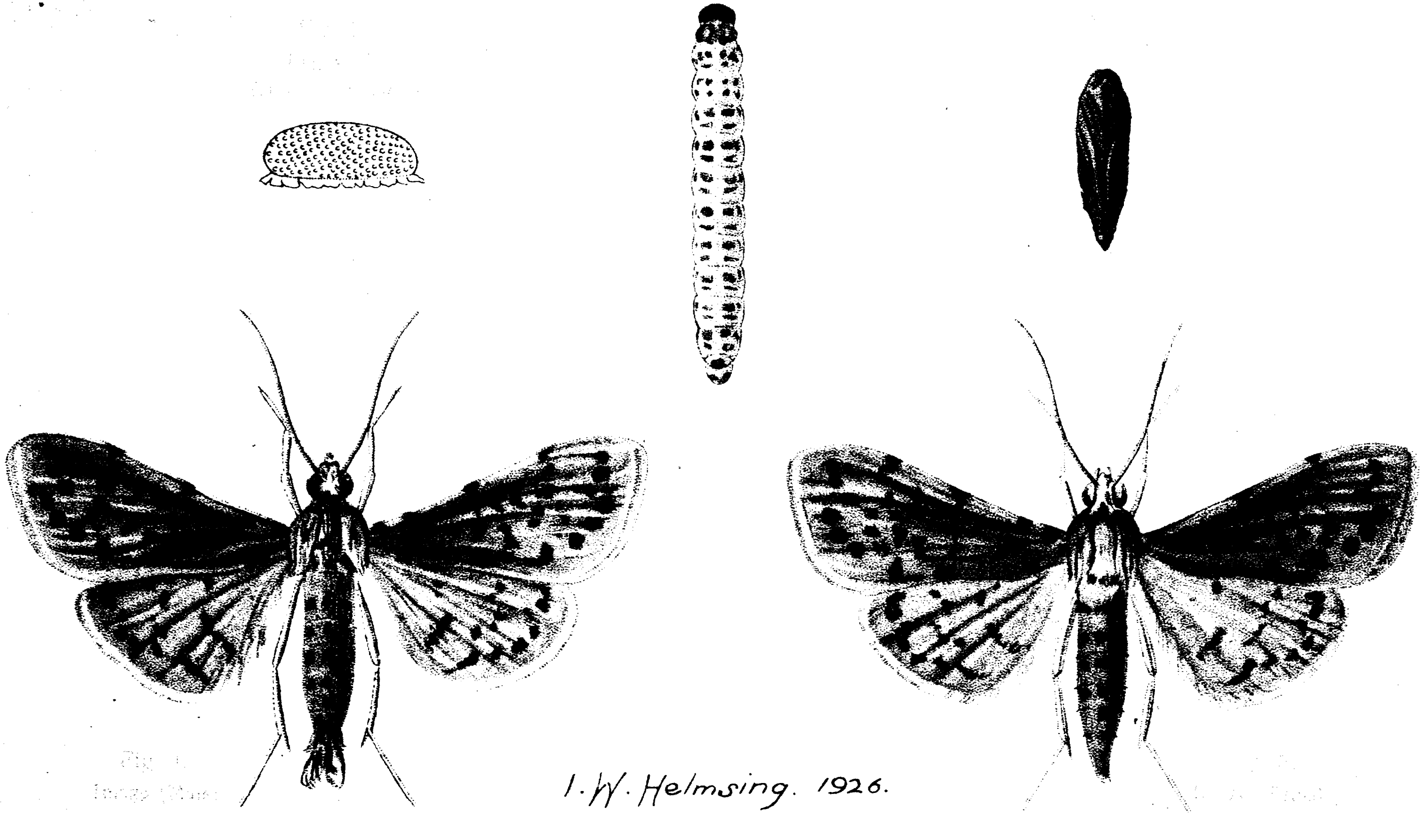
(ii.) If early sowing is possible, this in itself should ensure protection so far as experience goes at present. The latest date at which cotton can safely be sown to escape harmful Corn Ear Worm attack is the middle of October.

(iii.) Experiments with insecticides are not yet completed, but will be published later. So far it appears that two dustings with calcium

---

[4] *Triphleps australis* China.

[5] *Trichogamma rara* Girault; *Trichogamma australicum* Girault; *Neoteleonomus* sp.



I.W. Helmsing. 1926.

arsenate at the rate of 15 lb. of dust per acre at the time of squaring (two to three months from planting) at fourteen days' interval will check an attack.

THE PEACH GRUB.[6]

(Plate II.)

This insect is not so important a pest of cotton as the Corn Ear Worm, or the sucking insects which will be described later, but is taken now as, like the Corn Ear Worm, it is a pest of maize and in other ways its habits are similar.

Like the Corn Ear Worm, too, it is not peculiar to Australia, but exists in many other places as well.

The life-history of the Peach Grub is briefly as follows:—

The moth (Plate II., Figs. 4, 5) is a handsome orange-yellow insect with black spotted wings which measure rather less than 1 in. when stretched out. The eggs, which are very small cushion-shaped objects, when laid on cotton are put between the bracts and the boll, but are also laid on the boll itself. When ready to hatch, they are a conspicuous red colour. The little caterpillar or grub hatches out from the egg and burrows into the boll, often feeding about on the outside before burrowing in. The favourite place of entrance is at the bottom of the boll. Like the Corn Ear Worm it wanders about to a certain extent, and it is often difficult to tell whether a boll is attacked or not unless the under side is examined.

The full-grown grub (Plate II., Fig. 2) is usually a dirty-green colour, with many large oval darker green spots formed by a thickening of the skin. Sometimes it is distinctly pink, but the spots are dark green. When disturbed it drops towards the ground on a thread of silk. This is a very characteristic trick. The Peach Grub makes a large entrance hole and devours the seeds inside the boll. It generally leaves a small tube of silk hanging from the hole; this tube is always covered with excreta. Not only the bolls but also the stems may be attacked either from the side or bored directly down from the growing point.

When the grub is full fed, which takes about three weeks in late summer, it spins a cocoon inside a dried and damaged boll or on the outside, using the bracts as additional covering; or it may spin a leaf to a boll and make its chrysalis (Plate II., Fig. 3) inside. It does not pupate in the ground like the Corn Ear Worm. In course of time the moth emerges and mates, and the life cycle starts again.

As the weather cools in the autumn an increasing number of grubs spin cocoons or hide in old bolls (or damaged maize cobs) for the winter, emerging as moths in the spring.

On the coastal areas moths will come out in midwinter, but inland not until September.

---

[6] *Conogethes punctiferalis* Gn.

Practically no infection of cotton takes place until the end of February, and by the time a generation has been produced of sufficient numbers to be dangerous most of the cotton has been picked. *In all cases where Peach Grubs have done serious damage it has been found that cotton was planted late* or the season was such that cotton matured late.

Early planting, so desirable for other reasons, ensures protection from the Peach Moth. In localities where it is numerous it will take some of the top crop, but in anything approaching a favourable season this can be allowed to go, as it will in any case be poor-quality cotton owing to the boll-rots, which will be mentioned later.

To help keep the Peach Grub under control, cut and burn the crop as soon as a profitable picking has been obtained (as near the middle of July as possible). In this way all the overwintering grubs in the damaged bolls will be killed. Cows can be turned into the fields to eat off the remaining green bolls, but this should not be regarded as a method of control by itself, but simply as an accompaniment to the cutting and burning in July. Never store maize in the cob, as it is sure to contain grubs which will give rise to moths in the spring.

When a maize trap crop is being grown on the farm, numbers of Peach Grub Moths will be attracted to it. Indeed, the drying up and ripening of the ordinary commercial crop of maize seems to be the primary cause of Peach Grub Moths being driven to the cotton.

Besides maize and cotton, Peach Grubs attack sorghums, many kinds of fruit, beans, cowpeas, and castor.

SUMMARY.

(*a*) (i.) Peach Grub is a caterpillar about 1 in. in length, generally a dirty light-green colour with large conspicuous darker green spots. Its parent is a yellow moth with black spots on the wings.

(ii.) Eggs are usually laid by the moth on the boll, which the caterpillar attacks from below and eats out the seeds.

(iii.) The chrysalis is made inside or outside the damaged boll.

(iv.) The grub passes the winter in similar situations.

(*b*) *Protection.*—(i.) Early planting as for Corn Ear Worm.

(ii.) Cut and burn crop as soon as economically possible (mid-July).

THE PINK BOLL WORM.[7]

(Plate III., Figs. 4, 5.)

This insect occupies at present a peculiar position amongst Queensland's cotton-pests, in that, although it has been found in a seashore living species of Hibiscus all down the Queensland coast, it is only a pest of cotton as far south as a little below the 26th parallel.

---

[7] *Platyedra gossypiella* Saunders.

It is well established as a cotton pest in those districts first associated with cotton-growing, notably the coastal side of the ranges from Bundaberg to Rockhampton, the Dawson Valley, part of the Burnett, the Boyne Valley, and a very light infestation in the Callide Valley.

This boll worm is the caterpillar stage of a small greyish brown moth with fringed hind wings. The moth is very difficult to find in the field, but is sometimes seen amongst stored seed cotton. The boll worm itself is about ½ in. long when mature. It has a dark or lightish brown head, and is either more or less completely salmon-pink or the pink colour appears as spots. The only insects with which it is likely to be confused are a half-matured Peach Grub or a very small bright-pink caterpillar found in damaged bolls, but which is only a scavenger; and it can be distinguished from the former by the large dark-green spots on the Peach Grub and the Peach Grub's untidy habits of feeding, and from the scavenger by the more slim appearance, smaller size, and smaller light-brown head of that insect.[8]

Eggs are laid by the parent moth on bolls, often in the crack along which the mature boll will split, or at the base of the bracts surrounding the boll. The grub hatching from the eggs bores into the boll, sometimes feeding on the boll-wall for a time before entering a seed.

The wound made by its entrance into the boll heals up, and until the boll is opened there is nothing to show that a Pink Boll Worm is inside. Bolls about half-grown are preferred. When the grub is ready to turn into a chrysalis it cuts a hole to the outside. This is a very characteristic elliptical hole quite unlike the large holes made in bolls by Corn Ear Worm, Peach Grub, or Rough Boll Worm. The small brown chrysalis can often be seen in recently opened bolls or sometimes in the bracts of green ones.

When pressed for food the Pink Boll Worm will eat all parts of the cotton plants, but normally it prefers bolls.

The Pink Boll Worm has great powers of resistance to adverse conditions, and can, when mature, lie dormant for considerable periods. The writer has received live Pink Boll Worms from a sample of cotton which had been lying in a Sydney office for nearly two years.

What the Boll Worm does is to curl up inside a cotton seed, sometimes pulling another one over it and spinning the two together. In this state it can resist a surprising amount of drought and flood, heat and cold. It is this habit of lying up in the seed which has enabled it to penetrate into so many cotton-growing areas.

This pest has done a considerable amount of damage in Queensland in some places. The remedies are as follows:—

(1) *Never* grow standover cotton in any circumstances, and discourage your neighbours from doing it.

---

[8] *Pyroderces* sp. When any doubt exists, send specimens to the Chief Entomologist, Department of Agriculture, Brisbane.

(2) Do not ratoon, as the more early maturing ratoon plants give an advanced food supply to Pink Boll Worm, and annual cotton will then suffer.[9]

(3) Clean up fields after the last cotton crop, in more or less normal years by the middle of July.

It is better to sacrifice a few pounds of stained lint than to risk carrying Pink Boll Worm over the winter. Bushes should be heaped and allowed to dry and then set on fire. So far as can be managed, leave no bolls or trash lying in the fields, discourage all volunteer plants, and burn all old bushes, bolls, and trash at the end of the season. The greener the crop is when cut, the less fallen dried bolls there will be.

If all farmers in the Pink Boll Worm areas will co-operate in this, the pest will never assume first-class importance. If they neglect to do so, the cotton-growing industry might quite possibly be ruined.

The remaining remedy, that of disinfecting all seed by heat, is at present performed by Government, and presumably has had a good effect, as no new areas of Pink Boll Worm infection have been found since the 1924-25 Pink Boll Worm survey was made, after which date all seed for sowing has been treated by heat.[10]

Two machines are installed for treating seed, one at Rockhampton and one at Whinstanes. The seed is heated to 140 deg. F. and samples taken at intervals for testing germination.

The temperature of 140 deg. F. is sufficient to kill the boll worms, and does not injure the seed, which can survive a very much higher temperature.

(B) Minor Pests and Pests of Sporadic Occurrence.

CUTWORMS.[11]

These grubs turn up in certain years, and when they do so commit great havoc. They have not yet been sufficiently studied to enable one to say that they will be of annual occurrence. In November 1925 and October 1926, many early crops were lost and resowing necessitated by them.

Their method of attack is either to eat the leaves of seedlings when only a few inches high, or else to girdle the little plant, ringbark it as it were, so that it falls over and dies.

The grubs feed only at night, hiding by day in the soil near the plants.

---

[9] This is not mere theory but has been proved in three consecutive seasons.

[10] Apparently some doubt exists as to whether the Queensland Pink Boll Worm is the same as the one which has penetrated into almost all cotton-growing countries and done untold damage. Whether it is or not, it behaves in the same manner and is very closely related, and is potentially as dangerous.

[11] *Euxoa radians* Guen.

Like the Corn Ear Worm and Peach Grub, Cutworms are one stage in the life cycle of a moth. We do not know the causes of their sudden appearance, nor why they should be present in some years and absent in others.

They can, however, be controlled when they do appear. This can be effected by spreading a poisoned bait around the plants. The Cutworms will be attracted to this, feed on it, and die. The poison often takes a little time to act, but once it has been eaten the grubs cease to feed.

The presence of Cutworms can be detected when large pieces are seen to have been cut out of the first leaves, or when a seedling is seen to be girdled and has fallen over. If the soil in the vicinity of such seedlings is scraped over carefully, one or two dark, dirty-green grubs will be seen lying curled up under the soil. They are about the size of the Corn Ear Worm. This will be a sure indication that Cutworms are present, and steps should be taken at once to destroy them.

Apart from the poison bait, the formula for which is given below, chickens are useful allies of the farmer. Once they have been shown a few Cutworms and where they can be found, they will eagerly feed on them.

The formula for the bait is as follows:—Bran, 25 lb.; Paris green, 1 lb. Mix well together, then add molasses and sufficient water to ensure a mash damp enough just to crumble in the fingers.

This should be put out late in the evening. It might be necessary to repeat the application in a week's time. In late 1925 the cotton at Gatton Agricultural College and a plot in Brisbane were saved by the timely use of this bait, and success was obtained in 1926 in several localities by the same means.

Observations made at Biloela in 1926 showed that there was an intimate connection between the presence of bullhead and pigweed (specially the former) and Cutworm attack. It was found that, where bullhead was present either on headlands or in the fields and had not become straggly, it was always chosen by the Cutworm moths as a place under which to lay. It appeared that a shaded, moist soil was essential for egg-laying (although under certain conditions a moth will lay anywhere when forced to do so). Eggs are normally only laid in the soil and under cover. For a time, provided there is enough of the wild food plant, the grubs will feed on it, scattering later to the cotton.

Where fields are kept clean, our observations all pointed to the fact that attacks by Cutworms are *always the result of invasions from headlands or neighbouring weedy paddocks.*

We have seen no evidence to support the idea that eggs are laid under cotton plants, but everything points to their being laid in normal circumstances under low-growing, spreading weeds such as pigweed[12] and bullhead,[13] especially the latter.

---

[12] *Portulaca oleracea.*

[13] *Tribulis terrestris.*

Once more the necessity for clean cultivation for control of insect pests is demonstrated.

Cutworms, as is the case with other pests, have their enemies, which seem to make themselves felt very quickly. These includes a fly,[14] a predatory wasp[15] (a very hard worker which must destroy numbers of Cutworms), a parasitic wasp,[16] and an egg parasite.[17]

If an attack is noticed in time, it will seldom be necessary to bait a whole field; baiting in front of the attack and in the occupied area will be sufficient.

THE ROUGH BOLL WORM.[18]

(Plate III., Figs. 1, 2, 3.)

This boll worm is seldom a really serious pest, although it does a fair amount of damage in some localities in certain years. Like the other boll worms it is the caterpillar stage of a moth (Plate III., Fig. 3), a small insect with straw-coloured fore wings with a green, wedge-shaped strip running along the length of them, the narrow end of the wedge being towards the body. The moths measure ½ to ¾ in. across the outstretched wings.

The moth lays small white or bluish tinted eggs on the upper leaves and stem of cotton plants, one or two at a time on each plant. From these hatch the caterpillars (Plate III., Fig. 1), which either bore into the terminal or attack squares and eventually bolls.

When nearly mature the boll worm is about ¾ in. in length. The forepart near the head is chestnut brown, then a dark-brown area, then yellowish green and set with orange-coloured fleshy spines, those on the upper surface being surrounded by a dark-brown patch. The general effect is of a yellowish grey caterpillar with darker markings, the grey effect being produced by fine yellow lines on a dark background. The caterpillar is a very distinctive one and could not be mistaken for anything else.

The cocoon (Plate III., Fig. 2) is a greyish-coloured object, in shape rather like an upturned boat. It is made anywhere on the plant. The Rough Boll Worm sometimes does some harm to young plants by killing the terminal bud and causing heavy branching. When a big crop is set these branches often split off from the stem.

There is another caterpillar[19] which behaves in a very similar manner to the Rough Boll Worm. As a general rule it ceases to be a pest after early January, but late in the season sometimes increases

---

[14] Taehinidæ (unidentified).

[15] Sphegidæ—*Ammophila suspiciosa* Sm.

[16] Braconidæ (unidentified).

[17] *Schedius euxoæ* Gir. n.sp.

[18] *Earias huegeli* Rozenk.

[19] *Crocidosema plebiana* Zeller.

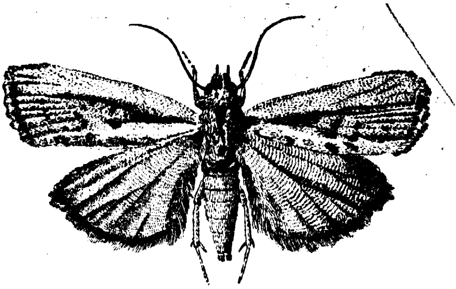


Fig 3

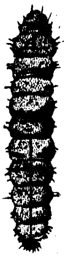


Fig 1

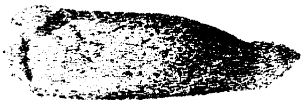


Fig 2

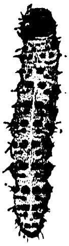


Fig 4

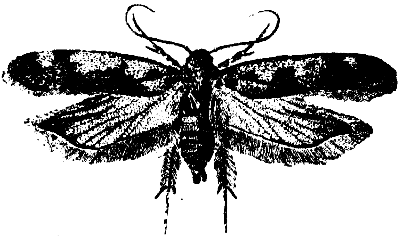


Fig 5

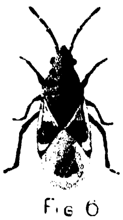


Fig 6

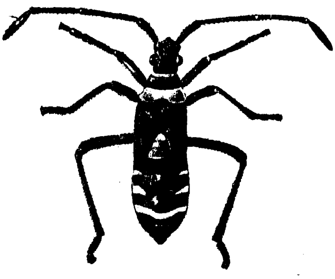


Fig 7

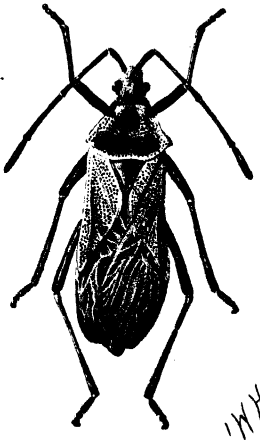


Fig 8

PLATE III.

FIG. 1.—Larva of *Earias huegeli.*
FIG. 2.—Cocoon of *Earias huegeli.*
FIG. 3.—Moth of *Earias huegeli.*
FIG. 4.—Pink Boll Worm larva (*Platyedra gossypiella*).
FIG. 5.—Pink Boll Worm Moth (*Platyedra gossypiella*).
FIG. 6.—Adult of *Oxycarænus luctuosus.*
FIG. 7.—Fifth instar of *Aulacosternum nigrorubrum.*
FIG. 8.—Adult of *Aulacosternum nigrorubrum.*
Fig. 6, × 5; all others by 2⅔.

again. This caterpillar is a small grub with a dark head with a faint pinkish flush just behind the head, but otherwise colourless. It is usually heavily parasitised and does not as a rule call for remedial measures. There are two other grubs which appear on the cotton. One[20] is a large grub rather bigger than the Corn Ear Worm, with a light stripe running the length of its body and a series of black triangular markings. When in a cotton field it will attack leaves, squares, and bolls. The eggs are laid in a mass covered with brown hair on the under sides of leaves, and the little, freshly hatched caterpillars feed in a group, scattering later as they grow older. The chrysalis stage is passed in the ground. The moth is a handsome insect with dark-brown fore wings marked with buff and with a violet patch near the upper angle. Fortunately these insects are only rarely seen in cotton fields.

The other grub is a green looper[21] caterpillar which eats leaves and occasionally bracts. The chrysalis is made in a rolled-up leaf. The moths are marked with yellow and brown, the males being darker than the females.

It is very rarely that this insect does any harm, indeed it often does good to a plant which has set too much leaf after excessive rain.

In 1923, in many places a small leaf-eating beetle did a lot of damage by defoliating the plants.[22] It has not been in evidence since that time. Should it reappear, the fact should be reported to the Chief Entomologist and specimens of the beetle sent to him.

The Stainers.

(Plate IV.)

The insects whose activities have been described in the preceding pages have four distinct phases in their lives, of which only one actually damages the cotton. Those phases are the adult moth, the egg, the caterpillar, and the chrysalis or pupa. The caterpillar stage is the destructive one. There is another class of insects, the bugs, which shows differences from the foregoing. Firstly, in the method of feeding. The bugs obtain their food by sucking; their mouths are provided with structure adapted to this, whereas caterpillars have jaws and bite their food. This difference is important, as it means that the bugs cannot be controlled by poisoning their food, while this is perfectly possible in the case of caterpillars. Secondly, there is no pupa or chrysalis stage; and thirdly, the young bugs or nymphs bear a general resemblance to their parents, and damage is done to plants by either nymphs or adults.

In most of the pests to be considered in this bulletin, the adults lay eggs either in the soil or on the cotton plants. The young bugs hatching from these soon begin to feed; they differ from their parents chiefly in

---

[20] *Prodenia litura* Bois.

[21] *Cosmophila flava* F.

[22] *Monolepta rosea* Blkb.

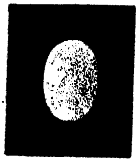


Fig. 1.

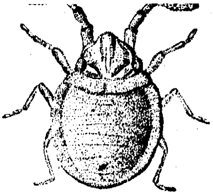


Fig. 2

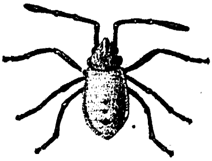


Fig 3

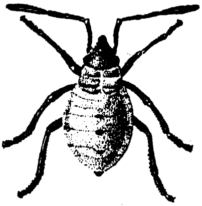


Fig. 4.

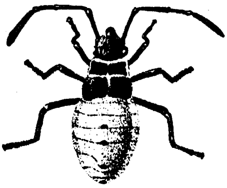


Fig. 5

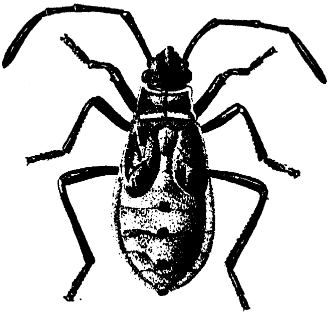


Fig. 6

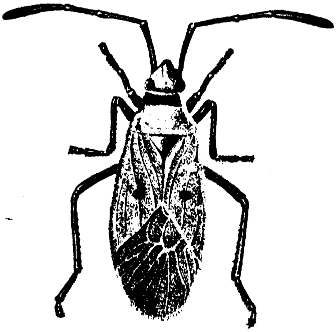


Fig 7.

Fig 9

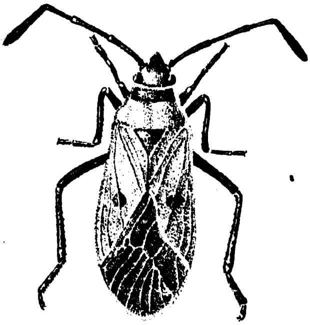


Fig 8

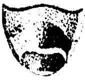
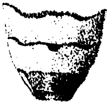


Fig 7A



I. H. Holmsing 1926.

Fig. 8A

Plate IV.—The Cotton Stainer (*Dysdercus sidæ*).

Fig. 1.—Egg × 12.
Fig. 2.—First instar × 12.
Fig. 3.—Second instar × 6.
Fig. 4.—Third instar × 6.
Fig. 5.—Fourth instar × 8.
Fig. 6.—Fifth instar × 4.
Fig. 7.—Adult male × 3.
Fig. 7A.—Posterior ventral segments (male) × 3.
Fig. 8.—Adult female × 3.
Fig. 8A.—Posterior ventral segments (female) × 3.
Fig. 9.—Femur × 8.

size and in the absence of wings. During the nymph life they cast their skins, or moult five times and after the fifth assume the adult form. The rudiments of the wings are visible after the third and fourth moults.

Feeding is effected by means of two pairs of needle-like structures, the stylets, which are enclosed in a jointed sheath, the rostrum. The stylets when applied to one another form two channels down one of which is a flow of saliva, and up the other the plant juices can be sucked; at the same time they are thrust into the part of the plant on which feeding is taking place, so that they are used for both sucking and piercing. The rostrum is not pushed into the plant, but is either folded under the body while feeding is in progress, or serves as a guide for the stylets.

This briefly is a general account of the habits of the bugs which is necessary for an understanding of the harm done by them, and the measures which must be taken to control them. The three insects to be considered now all damage the seed, and two of them damage the developing boll as well. They are the Harlequin Bug,[23] the Cotton Stainer,[24] and the Cotton Seed Bug.[25]

THE HARLEQUIN BUG.

This very handsome insect is to be found in most of the Pacific Islands, in Queensland and New South Wales, and in the Northern Territory. In the 1923-24 and the 1924-25 seasons it did a lot of damage to cotton in Queensland, causing stained lint, damaged seed, and deformed bolls.

The Harlequin Bug is a large, shield-shaped insect from $\frac{3}{4}$ to nearly 1 in. in length. Its colouring generally consists of some combination of yellow and orange and metallic green or blue. Certain individuals are scarlet and blue, these latter appearing mostly in the spring and autumn. All show a great variety of pattern, and are very conspicuous insects and not easily overlooked. The nymphs are coloured blue or green and red, except just after moulting, when they are a brilliant orange-red. The average length of life in the summer in Queensland is as follows:—Egg, 16 days; nymph, 70 to 77 days; adult, 90 days, more or less according to circumstances.

Investigations carried out at the Cotton Research Station show that in a normal season the Harlequin Bug migrants begin to come into the cotton fields shortly before the first flowers open, and keep on arriving after that time for a month or more; in the meanwhile the first arrivals have laid eggs, and soon the population in the fields increases rapidly.

---

[23] *Tectacoris lineola* F.; sometimes known as the Chinese Bug.

[24] *Dysderous sidæ* Montr.

[25] *Oxycarænus luctuosus* Montr.

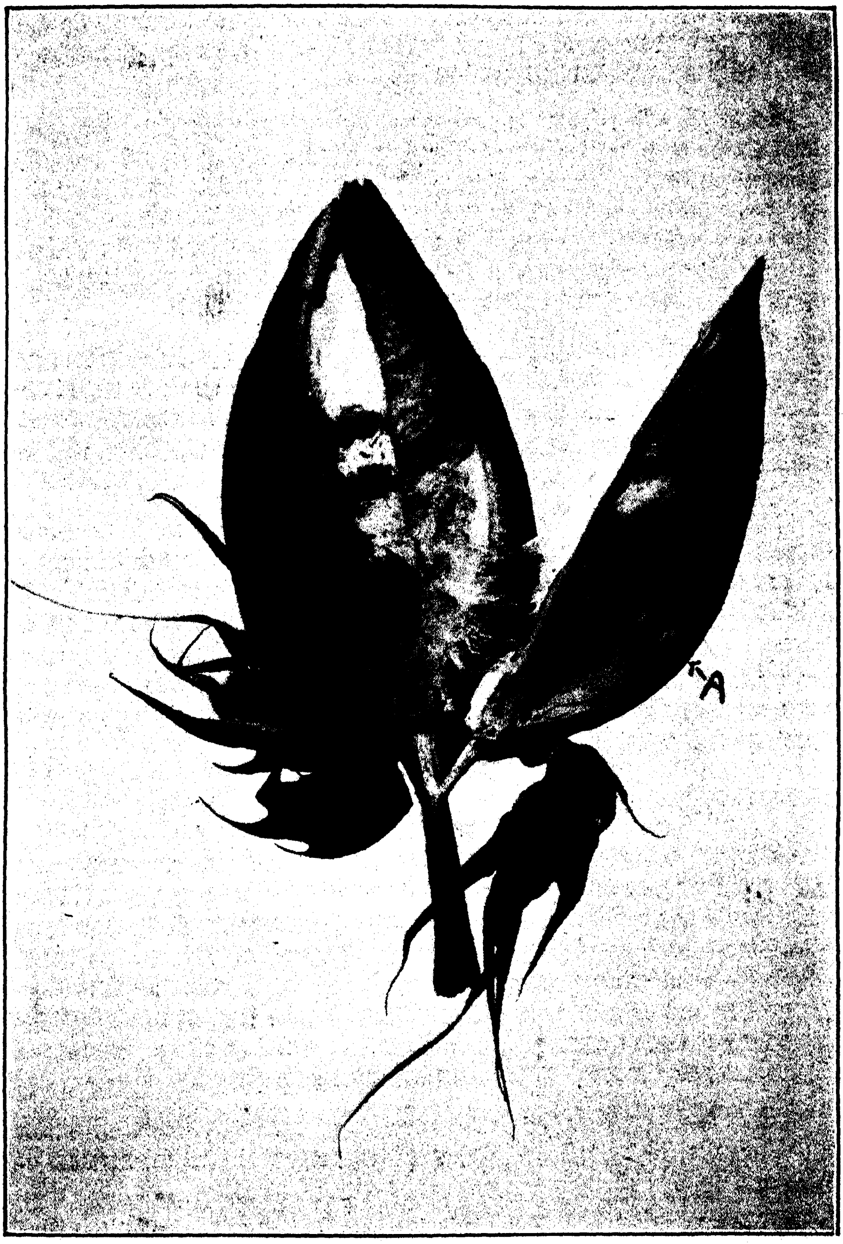


Plate V.

Showing damage done to cotton bolls by bug punctures through which fungus spores penetrate, staining and weakening the lint. At "A" is the callus surrounding the wound.

Young bolls are selected by the nymph and adults for food. When very young bolls are attacked, they are shed, but since the bugs do not breed very fast no great loss occurs from this cause, as the plants keep ahead with square and boll production.

Later on, when the bolls are bigger, the bugs are piercing them, and through the holes made in the boll-wall fungus spores or moulds get into the bolls and stain the lint. (Plate V.) When a seed is reached by the insects, as often happens, then that, too, becomes inoculated with a fungous disease.[26] The result is shown in brown-stained weak cotton, seeds failing to germinate, deformed and prematurely opening bolls. After bolls have opened, Harlequin Bugs feed on the seeds.

The actual amount of damage done to any boll by the sucking and puncturing alone is very small. The chief harm done by these bugs is in their providing a means of entrance to the moulds of boll-rot fungi. Towards the end of the season over 80 per cent. of the bolls will be affected by boll-rots alone.

Harlequin Bugs are on the whole lethargic animals, easily seen and caught. The eggs are laid some 80 to 120 at a time, wrapped round a twig or a leaf-stalk. They appear like a lot of small, pearly, pinkish pills side by side, forming a cylinder or very broad band around the place where they are laid. The nymphs generally live clustered together, especially in the early stages. Adults often sit about on the plants and are not easily disturbed. The females have the habit of sitting on their eggs until they hatch.

REMEDIES.

Harlequin Bugs come into the cotton fields from the scrub and places where other natural food plants exist.[27] While they are coming in they should be caught and destroyed. All egg-masses should be destroyed whenever found, as should also clusters of nymphs. Systematic hand-picking spread over a month will go far towards reducing infection. November and December would probably be the best months, but the bugs may not start coming in until later. It will depend on the state of the cotton and the effect of the previous spring on the bugs.

Very hot, dry weather checks the rate of increase; frosts kill adult bugs, but not the nymphs, which seem to be more resistant to extremes of heat and cold.

Like most insects the Harlequin Bug has its natural enemies, but they only exercise a partial control and do not keep it completely in check. Breeding appears to occur all the year round, although the life cycle is considerably prolonged during cold weather.

---

[26] *Fusarium moniliforme.*

[27] Bottle and Kurrajong trees (*Brachychiton* spp.) and *Hibiscus* spp.

THE STAINER.

DESCRIPTION.

The Stainers when adult (Plate IV., Figs. 7, *7a*, 8, *8a*) are medium-sized insects a little over ½ in. in length. The front part of the wings is either dark brown, brown-grey, reddish brown, or almost orange, the exact colour depending partially on age. There is a black dot in the middle of each wing, and the ends of the wings are very dark iridescent green. Legs and antennæ or feelers are dark brown or black. The under side of the body is white with a certain amount of black. This white colouring changes to yellow as the insect gets older.

There is another bug with which these might be confused, but this is red or orange and black underneath, and there are no spots on the wings.[28]

HABITS.

The Stainer has not yet been under observation sufficiently long for one to be absolutely certain when to expect the first arrivals in the fields. So far as we know, in a fairly normal season it will be about the beginning of the New Year, or approximately at the time the first bolls are beginning to open. The period of migration seemed to last a month of so, but a great deal depends upon meteorological conditions, and even more on the abundance and conditions of natural food plants. The bugs feed on green bolls, damaging them in the same manner as the Harlequin Bug. They show a decided preference for cotton seed, and provided the days are not too hot and dry numbers of Stainers can be found crowded into the open bolls, or on those which are just beginning to crack, for which they show a decided preference. Very hot weather causes them to remain inactive during the hottest times of the day, and they remain as much as possible in shelter. A heat wave such as that of February 1925 or the dry spring of 1926 checks them considerably. They are very dependent upon moisture, and will kill one another if they cannot get it. They have often been seen to feed on other insects.

Individuals will live as long as 65 days in favourable circumstances in the summer, and very much longer in the winter, the females laying as many as 850 eggs; probably 500 to 600 is about the usual amount (but much depends on the food upon which they are living). The number laid at any one time varies from about 50 to 100. They are always laid, a number together, either just under the surface of the soil or under a little clod or a piece of stick or some such protection. The eggs are like miniature hen's eggs (Plate IV., Fig. 1) when first laid—pearly, changing to orange before hatching. They hatch in 4 to 6½ days in summer. As the weather gets colder they may take over three weeks or a month, failing to hatch altogether when the average temperature is 60 deg. F. and below.

---

[28] *Aulacosternum nigrorubrum* Dall.

The little bugs (Plate IV., Figs. 2 to 6) emerging from the eggs are orange-red until after their first moult, when they are red and black. They get more white on the hind part of the body or the abdomen as they get older, especially in the last stage before becoming adult. All except the first stage are keen feeders on cotton seed, and they will also suck green bolls and the stem. They are fond of shade and moisture. Left undisturbed and provided with suitable food, the Stainers will go on breeding all the year round, and can always be found males and females coupled together. The only difference that cold weather seems to make is that all the different stages take longer to complete. Development seems to cease when the mean temperature averages below 60 deg. F. The nymph stage in summer lasts altogether about four weeks, so that it does not take long for the first migrants from the bush to breed up a big population. The early pickings of cotton are always much more free from stain than later ones, for this reason: Very hot weather, by limiting the activities of the Stainers, also means cotton free from the brown stain which takes so much off the prices. This was very noticeable in the 1925-26 season, when prolonged hot, dry weather was accompanied by a very small Stainer population, and the cotton in consequence was of exceptionally high grade.

OTHER FOOD PLANTS.

Stainers feed on several wild and cultivated plants besides cotton, but principally on those related to cotton, or closely allied families such as species of wild and cultivated hibiscus, bottle trees, kurrajong, *Sida retusa,* and other common weeds. So far as our investigations have gone, not even kurrajong and bottle-tree seeds have the same food value for Stainers as cotton. *Sida* and *Malvastrum* seeds only enable them to reproduce small broods.

CONTROL.

The stock remedies for Stainers are—

(1) Destruction of wild food-plants;

(2) Traps of cotton seed;

(3) Early clean-up of the crop; and

(4) A dead season when no cotton is grown.

No. 1 is out of the question in Queensland and will be for many years to come. No satisfactory trap is yet forthcoming which would commend itself to farmers, and experiments in this direction are still in progress. Insecticides are out of the question and need not be considered.

No. 3 is most important from every point of view, and is dealt with in detail later. It will be enough to say here that, if cotton is left to stand over or neglected, in the following season Stainers will get a flying start and begin breeding in the crop long before they would have done had there been a complete clean-up and burning of the previous season's crop. *A standover crop is far more dangerous than any wild plants in the bush.* When cotton bushes are stacked and left to dry before being burnt, most of the Stainers present in the fields will collect under them and will be destroyed when the stacks are set on fire.

SUMMARY.

(*a*) *Habits.*—(i.) Stainers begin coming in to the cotton in January, or later according to the season.

(ii.) Damage both by piercing bolls and admitting moulds and boll-rots and by damaging seed in open bolls.

(iii.) Life cycle in summer about five to six weeks.

(iv.) Eggs laid in the ground, young bugs feed on all parts of the plant, but specially seeds.

(v.) Flourish best in the presence of moisture and moderately high temperatures.

(*b*) *Protection.*—(i.) Traps are being tried but tests of this method are not yet completed.

(ii.) Clean-up of crop as soon as it is finished (June and July).

(iii.) Never leave cotton to stand over from one season to the next, as bugs shelter and breed in such fields.

COTTON SEED BUG.

(Plate III., Fig. 6.)

This little insect does no harm to cotton until the bolls open. It is coloured black with clear wings each bearing a large black spot. In length it is $\frac{1}{10}$ in. Early in the season it can be found feeding on the seeds of Sida sp., Wild Hibiscus, Flannel weed, and other related plants. It soon comes into the cotton and shelters in the squares, sometimes but rarely laying on a young boll. It does not begin to breed to any extent until bolls begin to open. Both young and adults feed on the seed, either in the mature boll or in a boll damaged by boll worms, and in which a hole has been cut. In very hot weather the open bolls are more or less deserted by day, but normally nymphs and adults crowd them.

Eggs are laid in the lint. They are quite easy to see once one is familiar with them, even when freshly laid. When nearly mature they assume a reddish orange colour (due to the developing nymph inside), and are then quite conspicuous. The eggs take 5 to 6 days to hatch and the whole life cycle occupies only about 20 to 30 days, so that multiplication is rapid.

The seed is damaged in the same manner as it is by the Harlequin Bug and the Stainer. This damage consists of a certain amount of mechanical damage, but a more serious thing is that the entrance for a fungus is made and very often the embryo in the seed is destroyed. (Plate VI.) In consequence, seed from a heavily attacked field shows

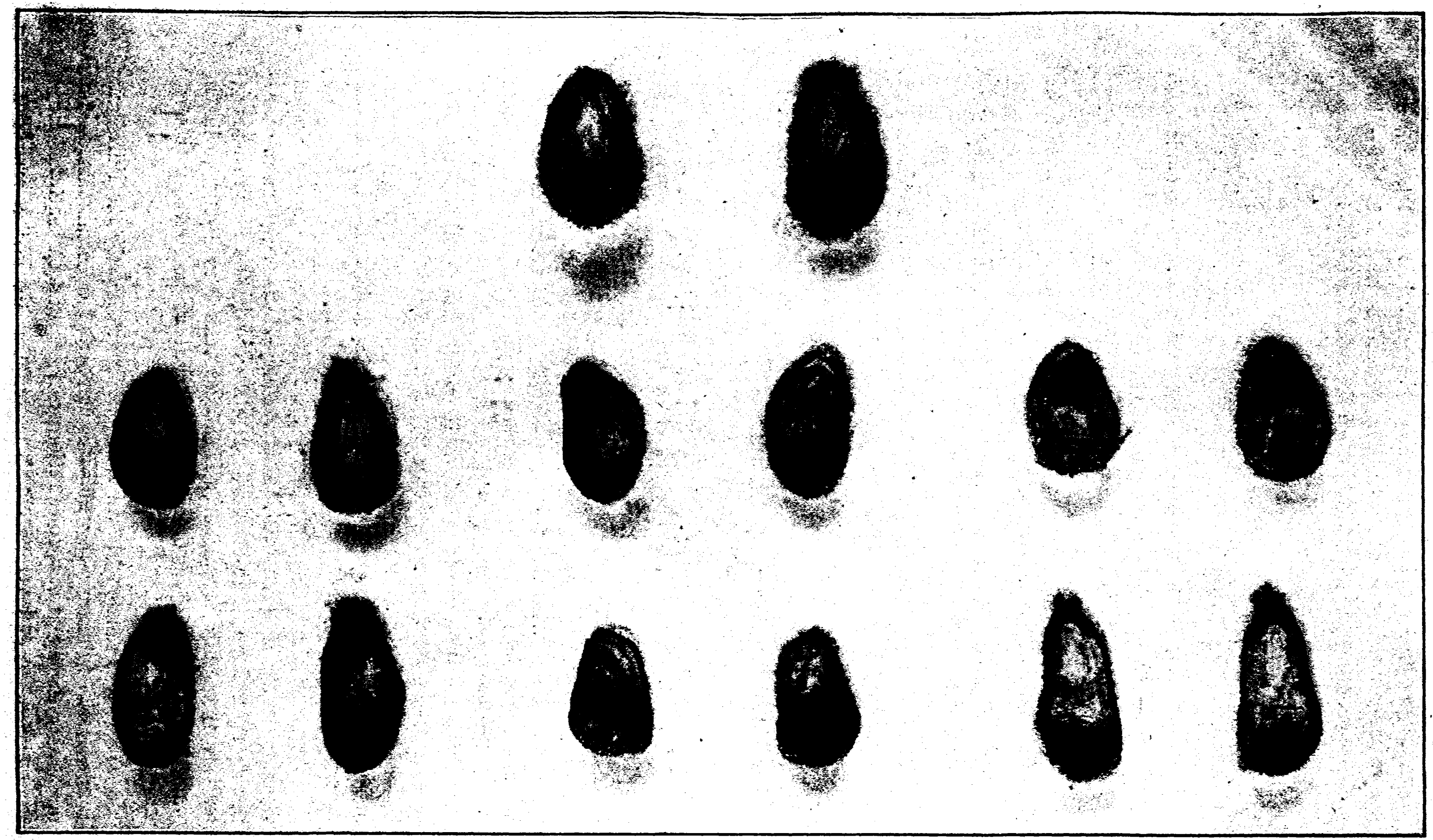


PLATE VI.

This Plate shows damage to cotton seed following piercing by *Dysdercus* or *Oxycarænus*. At the top is a normal seed and below two rows of seeds split, showing damage in different degrees.

poor germination, and the first pickings are better than subsequent ones. Seeds infected with the fungus sometimes germinate, but often the young root is subsequently attacked and the seedling withers. The effect of all three bugs is to reduce the amount of oil in the seed, so that a loss occurs whether the seed is used for sowing or not. The Cotton Seed Bug can often be seen sheltering in maize early in the season.

Bugs can be found sheltering in damaged and rejected bolls after picking is over. They seem to be resistant to low temperatures, for eggs and young ones have been found after hard frost and cold nights. High temperatures do not agree with them, and, in one lot of cotton which was under continuous observation during the exceptionally hot summer of 1926, the rate of increase was very low.

Remedies.

There is little that can be done to check these pests which would be economically possible apart from general cleanliness of the fields and headlands.

The damage done is confined to the seed, but in spite of this, with seed giving 65 per cent. germination under laboratory conditions if sown at the rate of 20 lb. to the acre, excellent strikes are obtained. At present this seed rate is all that is economically possible in the way of escaping from the effects of these bugs.

FALSE STAINER.

There is another bug[29] (Plate III., Figs. 7, 8) which, although at present of minor importance, might possibly become a major pest; indeed, even now in certain localities it causes quite a serious amount of square-shedding. This bug is in general appearance very like a Stainer and is often mistaken for one; it is known as the False Stainer. It belongs to a different family and has quite different habits. It is about ¾ in. in length with dark-brown or black legs and antennae, otherwise ochre-coloured except the membranous part of the fore wings, which is black. The under side of the abdomen is reddish or grey with black stripes.

The damage done by this insect is to squares and small bolls, which it pierces with its stylets and causes to shed. It arrives in the cotton fields late in November and is active during the next two months. The eggs are laid in small batches of 4 to 8 attached to a leaf, usually on the under side. They are small bronze objects flattened at one end. The nymphs (Plate III., Fig. 7) are conspicuously coloured black and red and yellow. There are two small parasitic wasps[30] which lay in the eggs, and which appear to keep the bug from becoming a serious pest; no other natural enemies have been found. The adults have been found during the winter sheltering in fence-posts.

---

[29] *Aulacosternum nigrorubrum* Dall. (Coreidæ).

[30] *Hadronotus hirsutioculis* Girault; *H. nigricornis* Dodd.

In addition to the foregoing, several other bugs cause a small amount of loss every season by inducing square-shedding or by infecting small bolls with disease, but they are of very minor importance and do not call for remedial measures.[31]

Aphids.

Aphids are often found in some numbers on young cotton, but very seldom do any damage, as they are quickly controlled by their numerous enemies, and, provided the plant itself is healthy, need cause no alarm.

Jassids or Leaf Hoppers.[32]

These little insects are sometimes mistaken for Aphids, although quite distinct from them. They only become a pest on cotton grown in certain soils unsuitable for cotton-growing, generally red volcanic scrub soil deficient in phosphates and potash. When they occur in large numbers it is a fairly sure sign of unsuitable soil.

CONCLUSION.

This finishes the list of bugs which are likely to come to the notice of the cotton farmer.

After seeing such a list of pests one might be tempted to ask, Can cotton possibly be grown at all? The answer to that question is that even in poor seasons excellent crops have been harvested.

In 1926, in the face of one of the biggest Corn Ear Worm attacks which the writer has seen, 1,200 and 1,500 lb. to the acre from a November-planted crop were secured on the Cotton Research Station at Biloela, by using a trap crop of maize. Early planting is advisable for many reasons, and, as has been seen, this also is of great assistance in checking or avoiding pests.

Two of the most common weeds which follow on cultivation are bull-head and pigweed. While these are young they form the favourite egg-laying place for the Cutworm moth, providing both the food for the little grubs and the shelter and moisture that the eggs appear to require. The Corn Ear Worm also feeds on pigweed until it has become too old and tough, and a cotton field full of pigweed is sure to attract Corn Ear Worm moths.

Stainers also feed on *Sida, Malvastrum,* and other allied plants found in headlands and paddocks.

Good and clean cultivation helps the farmer, not only by keeping his crop healthy in itself but by making life harder for the insects.

Another most important point in insect control is the early and thorough clean-up of the paddocks in which a cotton crop has been

---

[31] ***Philia senator*** **(Pentatomidæ);** ***Ragmus importunitas*** **Dist. (Capsidæ);** ***Creontiades modestus*** **Dist. (Capsidæ).**

[32] ***Empoasca*** **spp.**

grown. If a crop is "cow-pruned" or ratooned it will put out new shoots with the first rains, and in all probability, in the case of the former, unless there have been severe frosts, will have a sufficient number of bolls and flowers growing during the winter to support enough pests to ensure their getting a "flying start" with the first warm weather. Stainers and Cotton Seed Bugs pass the winter as adults; Pink Boll Worm can over-winter in old bolls and rubbish in the fields; so can the Yellow Peach Moth. When the cutting out of the old crop is delayed a bridge is provided between one crop and the next, and life is made easier for the pests. It is true that there are plants in the bush and scrub on which cotton pests can and do feed, but they are generally widely scattered and often not so nourishing as cotton. The farmer should aim at making the life of pests as difficult as possible. The standover crop, the crop which is cut out late, the paddock left with fallen bolls and rubbish in it, the ratoon crop, all help to keep pests going during the winter or give them an early start in the spring.

More than half the control lies in the hands of the farmer himself. It is realised that there are many difficulties to be met by the farmer in Queensland. These may include dry winter and spring conditions making an early plant difficult to get; or excessive rains when cultivation is impossible; or dry periods during the growing season. At the same time, if he would take a few simple precautions much loss could be avoided. Insects must be regarded as a constant factor in farming just as much as the weather or anything else, and precautions should be taken to control them.

TABLE SHOWING THE ACTIVITIES OF THE CHIEF COTTON PESTS THROUGHOUT THE SEASON IN INLAND DISTRICTS.

—	Corn Ear Worm.	Cutworm.	Stainers.	Peach Moth.
September . .	Moths emerge from hibernation; first eggs laid on weeds, &c.	Moths emerge from hibernation	On wild food-plants	Moths emerge from hibernation
October . .	First generation grubs on weeds and maize if present	Eggs laid under weeds; grubs in cotton	ditto	Grubs in maize, beans, fruit, &c.
November	First generation ends; second generation on weeds, maize, and cotton	Grubs in young cotton planted late	ditto	ditto
December . .	Second generation on weeds, maize, and cotton; third generation begins end of month	Grubs on weeds on headlands, &c.	Migration from bottle-trees, &c., to cotton commences (date varies)	ditto
January . .	Third generation on pigweed, maize, and cotton	ditto	Migration to cotton continues . .	ditto
February . .	Third generation ends; fourth generation on maize and cotton	ditto	In cotton	In cotton, &c.
March . .	Fourth generation on maize and cotton; life cycle lengthening	ditto	ditto	ditto
April . .	Fourth generation ends; fifth generation begins late in month on maize and cotton	ditto	ditto	ditto
May . .	Fifth generation on maize and cotton; hibernation begins with low temperatures	Hibernation begins	ditto	ditto
June . .	Hibernation in soil	Hibernation in soil	ditto	Hibernation in cotton, maize, &c. (if plants not destroyed)
July . .	Ditto	ditto	If bushes cut and burned, many destroyed; survivors in bush and standing cotton	ditto
August . .	Ditto	ditto	Survivors in bush and standing cotton	ditto

This table does not claim to be final. The exact date of hibernation will depend on whether the frosts are late or early and on the mildness of the winter. In a severe winter and late spring the emergence of those insects which hibernate in the soil will be delayed.

King & King, Ltd.

Music Warehouse, Queen Street

BRISBANE

-Our unique 60-guinea Cabinet Model.

In our previous advertisements we illustrated our wonderful value 16-guinea and 20-guinea

Symphonas

We wish now to bring under your notice one of our De Luxe Models. Our High-Class Symphonas are "A thing of beauty and a joy for ever." They are built to satisfy the most exacting taste, and being

SYMPHONAS

the tone quality is supreme.

We are agents for—

The Famous Columbia Portable at 6 guineas, Decca Portable Phonograph, Columbia and Regal Records.

In Pianos and Player Pianos—

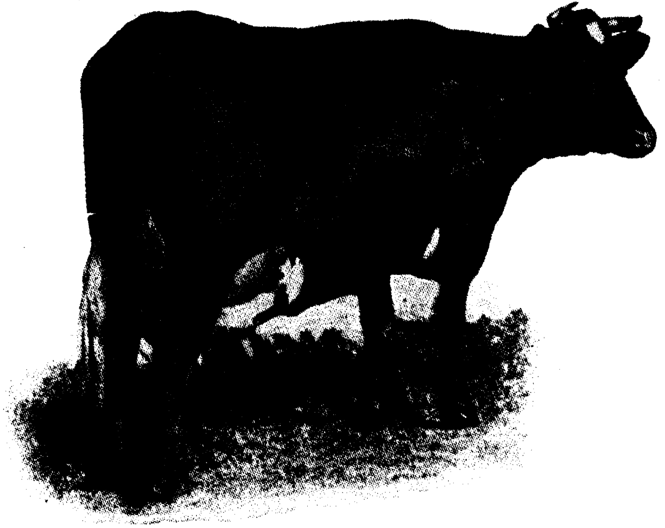
We offer the Highest Grade at reasonable prices. Our Agencies include—

THE BRINSMEAD
CABLE
GULBRANSEN
AUTO-HARMONIE

and other renowned makes.

We can satisfy all your musical wants
Write us for full particulars

Bacal Cottonseed Meal



Melba XV. of Darbalara (4188). Bred by and property of The Scottish Australian Investment Co. Ltd., Darbalara Estate, Gundagai. By Kitchener of Darbalara (419) ex Melba VII. (4181). Champion butter-producing cow of the World of all breeds. Produced 32,522 lb. milk, 1,614 lb. fat in 365 days, from July, 1923, to June, 1924.

"I have no doubt that Cottonseed Meal is a valuable adjunct to include in ration of concentrated food for heavy producing cows."

Extract from letter of Manager of Darbalara Estate.

SOLE DISTRIBUTORS:

Arthur Vale & Co. Pty. Ltd.

Union Bank Chambers, Queen St., Brisbane

BRITANNIA IRON WORKS

A. Sargeant & Co. Ltd.

Engineers, Boilermakers, Ship and General Smiths, Iron and Brass :: Founders and Finishers ::

Manufacturers of all descriptions of Machinery, Boilers, etc., Sluice Valves and Waterworks Specials, Cast and Wrought Iron Tanks.

Mining and Meatworks Machinery

Constructional Work of all kinds.
Castings of all descriptions.

Repairs promptly attended to

Alice, Albert, & Margaret Streets
BRISBANE

Estimates given **Inquiries promptly attended to**

Telephone: Central 6260 (2 lines)

PRIMARY PRODUCE EXPERIMENT STATIONS.

LEGISLATION FOR THEIR ESTABLISHMENT.

MINISTER'S SECOND-READING SPEECH ON NEW AGRICULTURAL MEASURE.

> **"It is the intention of the Government to co-operate to the greatest possible extent with the growers in the industry, our desire being to secure the interest and assistance of the banana-grower in the same manner as was secured from the sugar-grower. By that means much good will result; the industry will be built up; a greater number will be employed in the industry; and the sum total of the wealth produced in the State increased."**—*Mr. W. Forgan Smith, Minister for Agriculture and Stock.*

A new agricultural measure, having for its object the establishment of banana and other experimental stations, was introduced by the Secretary for Agriculture and Stock in the course of the month. Subjoined is the full text, taken from "Hansard," of the second-reading speech of Mr. Forgan Smith on the Bill, and which is of particular interest to rural producers.

The SECRETARY FOR AGRICULTURE (Hon. W. Forgan Smith, *Mackay*): As I explained at the introductory stage of this measure, it is intended to give the Government power to establish experiment stations for all forms of primary produce, following very largely the principles set out in the Sugar Experiment Stations Act, which have been of so much value to the sugar industry.

The main object of the Bill is to enable the Government to carry out various forms of research work that is necessary in the various primary industries, and co-ordinating the various activities engaged in that directon at the present time with a view to bringing about better results than have been obtained hitherto, so that the growers themselves will be personally interested in the various activities carried out. There is a considerable difference between experiment stations of this kind and the ordinary State farms that have been established in the past. Since I have been Secretary for Agriculture, and before then, I have noted that the sugar-grower took a very keen interest in the work of the sugar experiment stations, and that the various field days held by Mr. Easterby, the head of the department, and the work of his officers were closely followed by all those concerned in that industry, whereas, on the other hand, the work of the ordinary State farm did not receive such attention. Of course, a good deal of valuable work can be and is being done on State farms and will continue to be done on certain of them; but the work done does not receive the attention which appears to be desirable.

Mr. Peterson: Some of them are in the wrong place.

Experimental Plots—The Present Departmental System.

The SECRETARY FOR AGRICULTURE: Undoubtedly some of them are in the wrong place. The further point is often raised by settlers in the various districts that State farms may obtain certain results because they have ample machinery, ample labour, ample fertilisers, and all other resources at their disposal, while the farmer is not able to carry out his operations in the same manner. A good deal of success can be achieved by establishing experimental plots by arrangement with individual farmers in the various dstricts. The department frequently makes arrangements of that kind, selecting a good resourceful farmer in a given district. We make financial arrangements with him which are satisfactory to both parties, and then we are able to say to his neighbours that the work carried on by such and such an individual is an indication of what should be done throughout the district. Such a farmer sets a standard which his neighbours often endeavour to emulate; and it is our intention to continue and expand that policy as far as possible.

PLATE 150.—THE HON. W. FORGAN SMITH, DEPUTY PREMIER AND MINISTER FOR AGRICULTURE AND STOCK.

The Scientist and the Farmer.

Coming more particularly, however, to the work which it is proposed to do under this Bill, one must readily realise that, if good standards are to be maintained in Queensland, they can only be improved upon by our maintaining the highest degree of efficiency. In other words, we must bring science to bear on the problems of the average farmer and help him to solve those problems; and help him in his various difficulties with a view to enabling him to achieve better results from his own efforts than he has been able to achieve hitherto. Under the Bill we shall have power to deal with all forms of primary produce. It is intended, however, to apply ourselves in the beginning more particularly to the fruit industry.

Putting the Land to its Best Use.

Before I go on to deal with that, however, I wish to say that I have taken out some very interesting figures in connection with the primary products of Queensland, which I shall give to the House at a later date. I have also some interesting figures showing importations into Queensland and other States of Australia of products which, in our opinion, can be successfully grown in Queensland. Therefore, it is the function of my department, and the desire of all good Queenslanders, to see that the land of this State is put to the best use, and that information be made available to land settlers in regard to those crops which will find a ready market in Australia and which are suitable to the climate, soils, and conditions of this State. It is along that line that progress can be made and better results achieved. An example of the value of this kind of work can be seen in the sugar experiment stations I have referred to.

The Value of Sugar Experiment Stations Manifested.

When the Sugar Experiment Stations Act was passed the area of sugar-cane crushed in Queensland was 72,651 acres, and the yield 848,238 tons of sugar-cane, or an average of 11.68 tons of cane to the acre. The return from the cane was 92,554 tons of sugar, or an average of 9.44 tons of cane to the ton of sugar. Hon. members will note particularly those figures—a little over 11 tons of cane to the acre and about 9½ tons of cane to the ton of sugar.

In 1926 the area of cane crushed was 189,312 acres, which gave a return of 2,925,632 tons of cane, or an average of 15.45 tons of cane to the acre. From this cane 389,272 tons of sugar were made, or an average of 7.52 tons of cane to the ton of sugar. During the period of the activities of the sugar experiment stations the yield per acre increased from 11½ tons to 15¾ tons per acre, and the amount of sugar-cane required to produce a ton of sugar was reduced from 9½ tons to 7½ tons, showing remarkable progress during the period under review, and indicating that the industries in the State are getting a splendid return from the cost of the establishment of these experiment stations.

While giving due regard to the improvement that has taken place in the efficiency of the mills, I claim that most of that improved return is due to the improved methods of cultivation on the farms, due to the improvement in the various types of plants made available to the sugar farmer, and also to the research work accomplished in regard to dealing with the various diseases and pests which afflict that form of plant life. Well, I claim that what can be done in one industry can be done in all. Whilst the proportion of improvement may vary, all indications point to increased returns and greater economic advantages as a result of work along the lines I have indicated.

The Value of the Banana Industry.

As I pointed out yesterday, the banana industry is worth a little over £1,000,000 per annum to the people of Australia. It is an industry which gives a very good return to those engaged in it, and one which is capable of considerable improvement and expansion.

The hon. member for Windsor yesterday referred to the depreciation in quality of bananas. There is no doubt that depreciation in quality has taken place in certain districts. It will be the object of the stations which we propose to establish to lay down the facts with regard to that depreciation, to give the reasons for it, and to find a remedy. There is no doubt that one obvious reason can be stated at once. It is to be found in the depreciation of the lands under this crop. If men grow the same crop year after year without sufficient cultivation and do not fertilise, a depreciation of soil values must eventually be brought about, with the consequence that good results cannot be obtained. Plant life suffers from malnutrition, and similar results accrue from it as in the case of human beings or stock. It must be understood that to get the best results from any crop proper soil is required, and that that soil requires careful tilth and must have some of its constituents periodically renewed if the same crop is to be grown regularly. It is not possible to carry out a proper rotation of crops in many areas in Queensland such as can take place in other countries or other States in Australia. However, the banana-grower in the main is deeply interested in the future of his industry. I have occasion frequently to meet members of the various sectional committees, including that dealing with the banana industry; and they show an alertness of mind and an understanding of the needs of their industry which appeal to me very much. When that attitude of mind is shown by anyone in an industry, we are justified in assuming that he is prepared to take whatever steps may be necessary to improve the conditions in the industry in which he is engaged; and it is as a result of requests of various kinds and discussions with the banana-growers themselves that I have brought forward the Bill we are discussing this morning. The experiment stations will be subsidised by the Government, but will also be a charge on the industry itself. In the case of the sugar experiment stations the cost is divided between the grower and the Government, a levy being made per ton of cane and payable at the mill. Under this Bill the Governor in Council is empowered to make a levy on the produce of the type which it is proposed to assist, and the fund so collected will be subsidised by the Government with a view to helping the producers to bear the cost of carrying on the activities of the stations. The banana-growers and members of representative organisations to whom I have spoken are quite willing to incur such a responsibility, and evidently feel that advantages will accrue to them from the scheme. There is also in that connection the important fact to be borne in mind that where people are financially interested in the results of the stations or nurseries they will take a more active interest in their work than otherwise, and we shall thus be able to secure complete co-operation between the department and the growers in the industry concerned.

The Fiscal Question.

I mention also—and this is an important phase of the problem to which the grower of bananas must apply himself in this industry—the question of the Australian tariff or the protection that is given to this industry. I lay it down as a definite principle in a fiscal policy that, where a Government gives protection to any industry, it is the moral responsibility of that industry to see that they supply the people with a sufficient quantity of the commodity protected and of good quality to meet their needs. In other words, the National Government say to the industry, "We will give you protection for this industry; we will place an import duty on this commodity, which will enable you to carry on your industry under Australian conditions"; but the responsibility then falls on that industry to rise to the occasion and supply Australian needs in sufficient quantity and of a sufficiently high quality to meet the reasonable requirements of all concerned. That is a principle with which I think everyone will agree; and it is on the maintenance and the carrying out of that principle that the continuance of the duty depends. One can readily understand that, if the general public make serious complaints that they are not being properly served by an industry, any Government would be compelled to pay attention to such a state of affairs.

Supplying Australian Needs.

A good deal of work has already been done in connection with the banana industry; and various organisations of farmers have applied themselves very closely to this problem, achieving considerable results, but much yet remains to be done. I feel that an extension of the industry is required to enable us to meet the needs of Australia. There are areas in Queensland eminently suited to the cultivation of bananas. In many portions of Southern Queensland this industry is being carried on, and the fruit of a high quality is exported from the State and sold locally; but, owing to the ravages of bunchy top in many districts, the production fell away to some extent, some areas being compelled to go out of production. However, Professor Goddard, acting in co-operation with the Department of Agriculture, and assisted by the Commonwealth Government in certain laboratory tests and experiments, has been able to provide a means of coping with this disease, although no remedy or specific that will immediately affect the result has been provided. It is unreasonable to expect that. Unfortunately, we cannot expect any specific that will provide for the immediate eradication of disease in plant or human life; but in connection with the banana industry methods have been set out, which, if followed properly, will enable this disease to be kept under control. If the banana-growers in Queensland carry out the instructions of the department as set out by the investigation committee, this disease can be kept under control, and the losses that have occurred in the past will not be repeated in the future.

Bananas in the North.

As the hon. member for Windsor mentioned yesterday, in the northern portions of the State a considerable area was placed under banana cultivation many years ago, but that there has been a great falling off in the industry of late years. I was asked by the hon. member as to the chief reason for this falling off. There is no doubt that one reason has been the development of the sugar industry. The farmer and landholder in areas suitable for the development of sugar-cane found it a more valuable and satisfactory crop than bananas. That was due chiefly to the fact that sugar-mills were provided in suitable areas in the North, and those mills were at all times prepared to take the cane supplied to them by growers within their areas. In other words, the grower of cane was assured of a market in his own district, whereas the banana-grower at that time was dependent on shipping, and much loss resulted to him in transhipping his product from the place where it was grown to where it was sold. Boats loaded at Cairns or Innisfail often took a considerable time to reach their destination. The conditions under which the product was handled and various other factors militated against the the farmer securing the best result for his product. In addition, sailings were so few that often a farmer was not able to market his product in a fresh condition. Because of those reasons the banana-grower discontinued operations on a large scale; but in recent years, owing to the situation in the sugar industry where production has overtaken the consumption, farmers have looked to other activities to utilise their available land. There are very rich areas of fertile soil in North Queensland that are not required for sugar cultivation, and during the past two or three years we have been encouraging the holders of these lands to extend their operations into banana cultivation with a view to developing that industry, and with a view to enabling them to make a livelihood from that crop. The Department of Agriculture has been carrying out experiments with bananas at various State experiment stations in the North and on various Crown lands, with a view to developing a type suitable to the conditions obtaining there. Experiments have been carried out at South Johnstone and elsewhere by the fruit section of the department, and up to the present time they have given very satisfactory results, and a considerable development has taken place in the volume of export of bananas from the North. As a matter of fact, I am satisfied that it will be necessary in the very near future to run special fruit trains from North Queensland to cope with the production that is now being carried on there. (Hear, hear!) Another interesting feature is that the product of the grower on the Johnstone River and the northern portions of the State generally carries well and opens up in good condition in the markets in the Southern States. (Hear, hear!) I have heard nothing but excellent reports of the product grown in those areas. However, a good deal remains to be done in that connection, and I am satisfied that work along those lines will give a satisfactory return.

Commercial Varieties.

The type of banana grown is one that is also being dealt with. I think it was the hon. member for Windsor who yesterday referred to the Gros Michel banana that is grown in other parts of the world. Some years ago the Department of Agriculture imported suckers and plants of the Gros Michel variety, and these were distributed to banana-growers in Queensland with a view to trying them out under Queensland conditions. Unfortunately, a careful record of that distribution was not kept, and the result of the experiment cannot be regarded as satisfactorily affording a definite indication for or against that particular type of banana. Its development under Queensland conditions will require careful observation, so that its history may be carefully noted to determine whether it is a suitable banana for growing in the State. However, further experiments are being conducted to that end in North Queensland, and, as a matter of fact, a considerable portion of the new areas recently planted with bananas is represented by the Gros Michel type in addition to the Cavendish variety. It is interestng to note that nearly four-fifths of the commercial bananas grown in the world are of the Gros Michel type; and one large American firm—Elders, Fyffe, and Company—engaged in the exportation of bananas to Great Britain and other European countries has three-quarters of its turnover represented by that variety. At the same time, it must not be assumed that the Gros Michel is the only type of banana that can be developed and made suitable, a fact which is proved by the action of some of the companies in the West Indies recently sending an officer to Queensland with a view to testing the suitability of other types for their requirements. This type of banana is particularly liable to be afflicted by a disease known as the "Panama" disease, and in view of this fact we have been careful not to encourage the importation of the Gros Michel to Queensland, our experiments being conducted with plants that were imported here many years ago. We consider that it is safer to carry on research on a small scale in that way rather than to encourage importations from other countries with the liability of introducing undesirable forms of disease.

Transport.

In addition to growing the best types of bananas and ascertaining their liability to disease or otherwise, a good deal requires to be done in connection with the transport of this fruit. From investigations which I have recently made I find that a company operating in the West Indies has vessels specially constructed for the transport of this fruit in order to ensure its being marketed in as fine a condition as possible. On the railways special trucks are made available, and everything is done to ensure a high marketable quality. It will be seen, therefore, that a good deal of work requires to be done in this State to ensure the proper handling of the product after it has been successfully grown, because, if methods are laid down whereby bananas can be grown in commercial quantities, it is necessary also to provide for proper handling so that economic loss will not result in transit. In that and in other directions work will be undertaken under the measure now being considered.

The Government's Rural Policy.

It is the intention of the Government to co-operate to the greatest possible extent with the growers in the industry, our desire being to secure the interest and assistance of the banana-grower in the same manner as was secured from the sugar-grower. By that means much good will result; the industry will be built up; greater number of men employed in the industry; and the sum total of the wealth produced in this State increased. I think I have said sufficient to outline the main principles of the Bill, and, therefore, I have much pleasure in moving—

"That the Bill be now read a second time."

Honourable Members: Hear, hear!

GREEN MANURING.

By GEO. WILLIAMS, Acting Director of Fruit Culture.

The maintenance of a reasonable supply of humus in orchard soils, more particularly when planted with citrus, is universally recognised as a necessity, and the most economic way of ensuring it is by systematic application of green manure. Various crops are grown for the purpose, including barley, maize, natal grass, and legumes. The selection of a particular variety to be grown will be guided by local conditions, and in the case of deciduous fruits an autumn or early spring crop would be the most suitable. Summer crops would impede operations among fruiting trees and would not on account of orchard activities have a reasonable chance of development. Among citrus a summer crop is the most suitable, harvesting and cultural operations being against the success of a winter growth. Where land is liable to "wash," clean cultivation during summer months is inadvisable and the growing of a cover crop calculated to prevent damage by storm waters should be a regular practice. Where slopes are not very defined, cowpeas make an excellent covering and provide a heavy crop for ploughing in. Mauritius and other varieties of beans are also well suited for the purpose, but being particularly vigorous require more attention to keep them from over-running young trees; besides, when developed they are not so easily ploughed in. Although beans and peas have a decided tendency to improve the soil, they are not capable of making good deficiencies, and a liberal fertilising to induce luxuriant growth is most beneficial, for it stimulates both the trees and the cover crop; and, when the latter is ploughed under, such quantities as have been absorbed by it are augmented and returned to the soil. Light soils are generally deficient in humus or quickly become so after cropping and consequently are less capable of retaining moisture or the fertilisers that may have been applied. The deficiencies are reflected in the colour of the foliage, particularly when the trees are carrying a crop, and this in consequence is also affected detrimentally. Unfortunately, the practice of green manuring or maintaining the requisite supply of humus is not general. The illustration depicts the extent of growth attained by cowpea in Mr. T. Allen's orchard (Palmwoods) in light sandy loam.

PLATE 151.—COW PEA, A GREEN-MANURING CROP GROWING IN LIGHT, SANDY LOAM ON MR. T. ALLEN'S ORCHARD, PALMWOODS.

RURAL ROUTES IN QUEENSLAND.

THE WORK OF THE MAIN ROADS COMMISSION.

The Sixth Annual Report of the Main Roads Commission, from which the subjoined notes have been abstracted, commends itself strongly to all concerned with rural progress.

As a result of the carefully organised work of the Commission a net of well-constructed arterial highways is spreading gradually over the map. A survey of a year's activities discloses the extent to which the Commission has become a factor in the enrichment of rural life in Queensland.

Through the courtesy of the Commission we are enabled to reproduce herein some of the excellent plates contained in its Report, and which illustrate the value of its general community services.—Ed.

THE POLICY OF THE COMMISSION.

During the past few years a revolution in transport has been effected in most civilised countries, due to the increased use of the motor vehicle and the construction of better roads. In Queensland we have the experienc of good roads having caused increases in traffic of more than 100 per cent. within a few years, and it is proposed to publish the traffic census studies which are in progress, to show the relation between road improvement and volume of traffic, which incidentally brings in its train additional maintenance costs.

The Commission has been subjected to some criticism at times for what has been described as "its piecemeal system of construction." Thinking persons will, however, realise that with the vast mileage of unimproved roads in this State it is not possible to start in some heavily trafficked centres and work continuously outwards to completion with a first-class pavement on any one road. More improvements have been effected where the traffic is densest, but in general the policy has been to take the worst sections of the road and make them as traffickable as possible within the shortest period of time possible. The work done has been of such a standard that it will be capable of progressive improvement from time to time as traffic demands need and give the greatest benefit to the greatest number. The opposite policy, which is advocated by some people, is to start constructing, continuously, high-class pavements, in all directions, radiating from the big centres. The effect of this would be that only a very small proportion of the traffic of the country would receive any material benefit from main roads construction.

Much of the work done to date has involved the construction of the very worst portions of the roads, and consequently the hold-up of traffic on main roads is nothing like so frequent as it was four or five years ago. At the inception of the main roads scheme in 1921 a system of roads—arterial and branch—was mapped and has been added to from time to time, but the endeavour has, all through, been to make a connected system of roads which in the course of time will, it is hoped, in the more closely settled areas, be all paved or all capable of being travelled in all weathers, whilst in the pastoral areas the construction of bridges and floodways will greatly assist transport.

The gazettal and construction of all these roads has been done in fullest co-operation with the Local Authorities of the State. No section of road has been constructed without the proposal having been first fully discussed with the Local

Authority, which in general has been the constructing authority, and the same may be said with regard to the whole planning of the system. Local knowledge has thus been fully availed of. The construction of main roads has stimulated a general improvement in Local Authority works, and road construction throughout the State and main roads methods have been adopted in very many shires, which have now provided modern road plant, thereby reducing the cost of their works and rendering more effective maintenance of their own roads possible.

The motor-car to-day has become such an adjunct to general travel that agitation for construction of trunk and arterial roads has been almost incessant. Considerable agitation has existed for the construction of bridges on the South Coast road, between the Queensland border and Brisbane (in order to replace the ferries), and also in other parts of the State. It is understood that one of the Local Authorities obtains about £800 per year from a ferry contractor for the right to charge for the carriage of vehicles, &c., across the river. The ferry facilities are such that during holiday

Plate 152.

Jungle Section, Gordonvale-Little Mulgrave Road, Gravelling in Progress.

time vehicles are often required to wait for over an hour. It is now proposed to bridge, at the earliest opportunity, these rivers where crossed by main roads, and plans are in course of preparation with this end in view.

"SELL OUR SCENERY."

It cannot be too strongly urged (the Report continues) that the tourist traffic should not be overlooked. The reports of most of the Highway Commissions of America stress this point, and the slogan "Sell our Scenery" is a common one. Some consideration might be given to the provision of funds for tourist roads or tracks in various parts of the State, as such money judiciously expended would be a sound investment in advertising alone. The Main Roads Act makes no provision for purely tourist roads to our national parks.

Proper co-ordination of road and rail services is essential to-day if this country is not to lag behind. The construction of good roads connecting centres of population and leading to railways should do very much towards keeping people on the land. What good roads have done in Victoria is illustrated in the Annual Report of the Victorian Country Roads Board for 1925, which reviews the effect of the roads constructed by the Board in Victoria. It is stated that the increase in valuation of Gippsland properties in twelve years amounts to £28,000,000, whereas road construction amounted to £3,340,000 in the same period. Since the construction of the Point Nepean road, the increase in valuation has also been very apparent, having risen from £5,000,000 in 1913 to £13,940,000 in 1925. By Act No. 3425 the Victorian Government now provides £1,000,000 per annum for five years for main roads works, and £150,000 of this shall each year be employed for works in undeveloped mountain areas free of charge entirely to the shires.

PLATE 153.

A LOOP ON PALMWOODS-MONTVILLE MOUNTAIN SECTION.
Connecting the Montville orchards with the North Coast Railway.

The Report contains much useful information and valuable data, including sketch plans and plates showing the several methods of construction adopted by the Commission.

PLATE 154.
FOREST CLEARING ON APPROACHES, BARAMBAH CREEK BRIDGE, GAYNDAH-GOOMERI ROAD.

PLATE 155.
CAIRNS RANGE. SECTION SKIRTING CANEFIELDS, MULGRAVE VALLEY.

PLATE 156.
RAVENSHOE-MOURILYAN ROAD, EVELYN TABLELANDS, NORTH QUEENSLAND, AFTER SEVERAL YEARS OF TRAFFIC. MACADAM WITH LOCAL BINDER.

PLATE 157.
MULGRAVE RIVER VALLEY, SERVED BY CAIRNS RANGE ROAD.

PLATE 158.

BEAUDESERT-LADYBROOK. DEVIATION GRAVELLED NEAR BEAUDESERT.

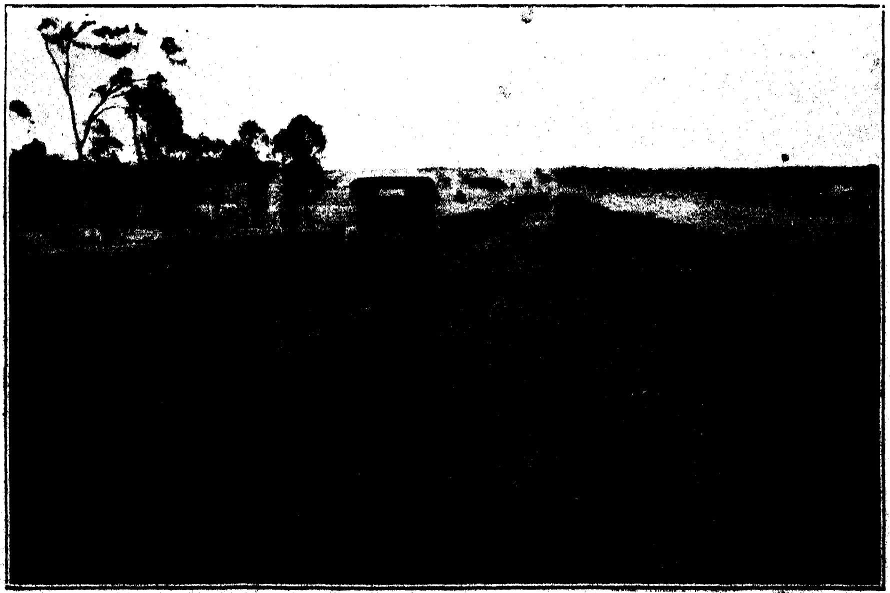


PLATE 159.

ROMA-MARANOA GRAVEL ROAD.

PLATE 160.
GAYNDAH-GOOMERI, CRUSHED BASALT.

PLATE 161.
"C" CLASS METAL, GOOMERI-CHILDERS ROAD, NEAR BIGGENDEN.

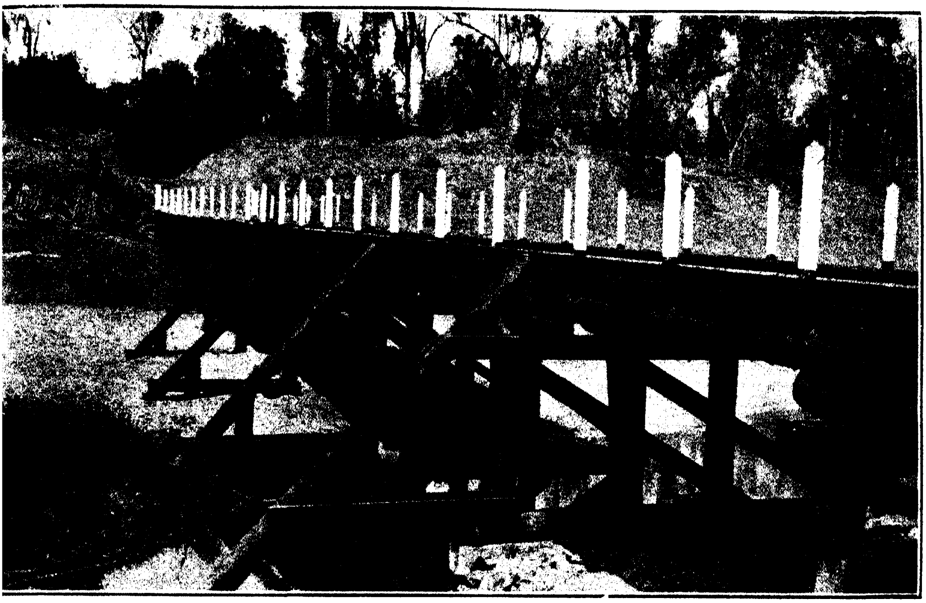


Plate 162.
Low-level Bridge, Stuart River, Wondai-Proston Road.

Plate 163.
Cairns-Port Douglas Road.

AN AUTOMATIC GATE.

On page 486 of the last (November) issue, a descriptive note, together with sketch plan, kindly supplied by Mr. N. A. R. Pollock, Northern Instructor in Agriculture, of this gate was published. The principle on which it works is the original idea of Mr. Jack Jones, of Britannia Station, near Charters Towers, Queensland. Our plates, for which we are also indebted to Mr. Pollock, illustrate the gate in operation, its simplicity and efficiency.

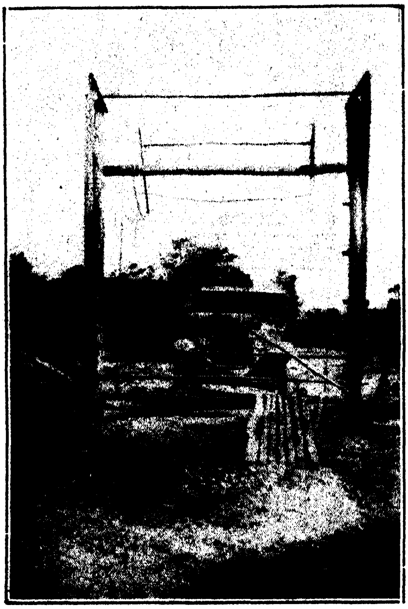


PLATE 164 (Fig. 1).—GATE DOWN; CAR APPROACHING.

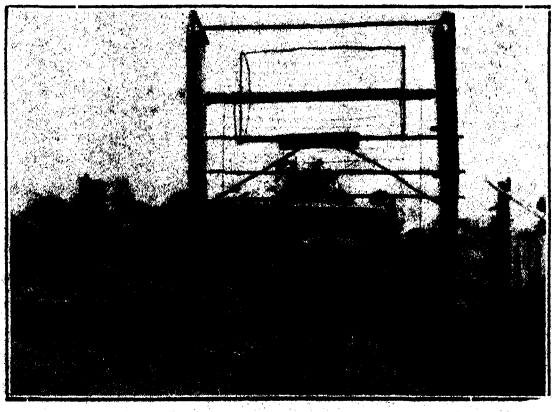


PLATE 165 (Fig. 2).—CAR HALFWAY IN; BEARER COMING UP; GATE RISING.

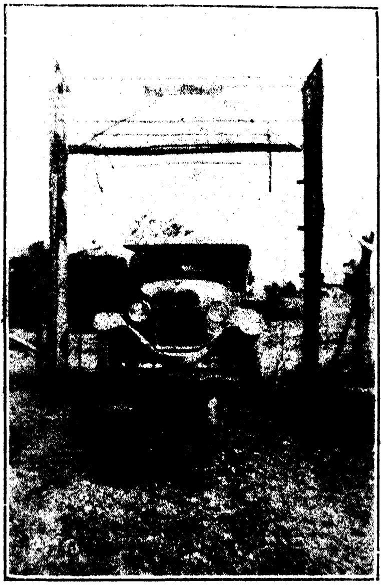


PLATE 166 (Fig. 3).—CAR STATIONARY UNDER GATE; GATE UP.

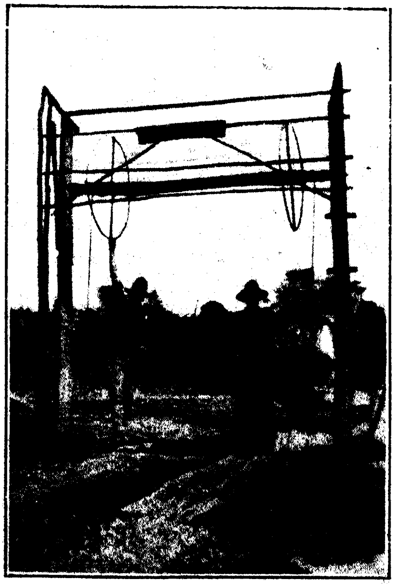


PLATE 167 (Fig. 4).—GATE RISEN BY THE WEIGHT OF TWO MEN STANDING ON BEARERS; GATE UP.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING OCTOBER, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1927.	Oct., 1926.
North Coast.	In.		In.	In.
Atherton	0.89	26	0·59	0
Cairns	1·84	45	1·72	0
Cardwell	1·95	53	2·11	0
Cooktown	1·05	51	0·10	0·06
Herberton	0·89	40	0·86	0
Ingham	1·55	35	1·66	0
Innisfail	2·88	46	5·35	0·09
Mossman	2·73	14	4·22	0·09
Townsville	1·26	56	0·45	0·07
Central Coast.				
Ayr	0·99	40	0·19	0
Bowen	1·06	56	0·90	0
Charters Towers ..	0·68	45	0·35	0·26
Mackay	1·77	56	1·98	1·22
Proserpine	1·74	24	3·25	0
St. Lawrence ...	1·75	56	3·01	0·12
South Coast.				
Biggenden	2·25	28	3·41	1·60
Bundaberg	1·99	44	3·01	0·74
Brisbane	2·56	76	7·15	0·87
Caboolture	2·49	40	2·55	0·96
Childers	2·39	32	4·86	0·51
Crohamhurst ...	3·39	35	5·74	0·56
Esk	2·36	40	6·38	0·42
Gayndah	2·34	56	4·19	0·43
Gympie	2·66	57	4·54	0·40
Kilkivan	2·54	48	5·09	0·60
Maryborough ...	2·60	55	7·05	1·05
South Coast— continued:	In.		In.	In.
Nambour	2·94	31	4·37	0·54
Nanango	2·28	45	3·38	0·15
Rockhampton ...	1·79	40	2·19	0·06
Woodford ...	2·50	40	2·55	0·31
Darling Downs.				
Dalby	2·03	57	2·66	1·16
Emu Vale ...	2·11	31	4·50	0·76
Jimbour	1·85	39	2·87	1·37
Miles	1·98	42	2·83	0·63
Stanthorpe ...	2·54	54	2·62	0·96
Toowoomba ...	2·55	55	3·16	1·29
Warwick	2·27	62	2·99	0·80
Maranoa.				
Roma	1·75	53	2·99	0·22
State Farms, &c.				
Bungeworgorai ...	1·52	12	2·12	0·22
Gatton College ...	2·05	27	2·84	0·82
Gindie	1·42	27	2·32	0·00
Hermitage ...	1·89	20	3·46	0·63
Kairi	1·10	12	0·70	0·22
Sugar Experiment Station, Mackay	1·56	29	1·86	0·75
Warren	2·14	12	2·58	0·00

NOTE.—The averages have been compiled from official data during the periods indicated; but th totals for October, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,

Divisional Meteorologist

WELL WORTH READING.

A Coalstoun Lake's subscriber writes:—"I have been getting the Journal for about fifteen years. . . . I always look forward to receiving it, and consider it well worth reading."

Buy

RELIABLE TYPEWRITERS

from a

RELIABLE FIRM.

We are Sole Agents for—

L. C. SMITH silent ball-bearing Typewriters
CORONA - - Portable Typewriters
GESTETNER - All British Duplicators
DALTON - - Adding Machines
MARCHANT - Calculating Machines

WE also have a large stock of second-hand Typewriters of all makes, thoroughly reliable, fully guaranteed, and at prices from £5 to £20. Terms from £1 deposit and £1 monthly can be arranged to suit clients. Everything we sell is fully guaranteed. Write for particulars.

ESTABLISHED 1903

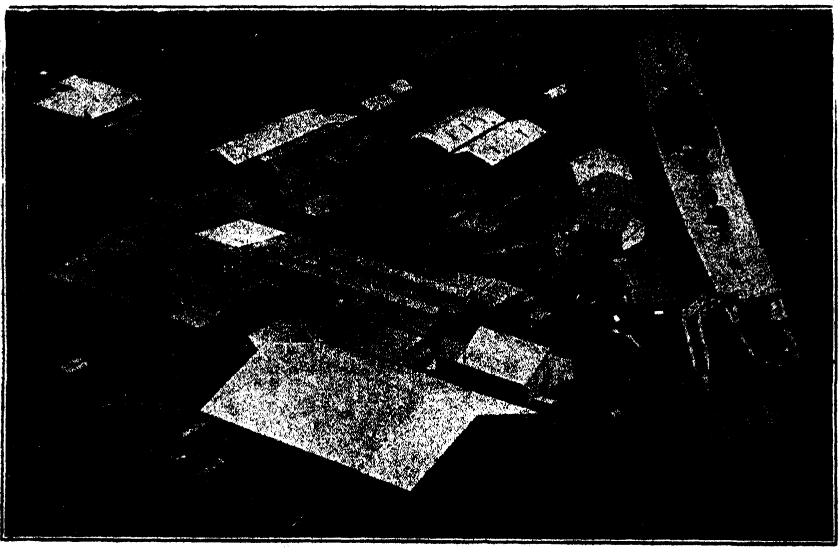
MACDOUGALLS LTD.

(formerly Australian Typewriter Supplies Co.)

363-365 Queen Street

Box 345 **BRISBANE** *'Phone: 717-718*

McKenzie & Holland
(Australia) Pty. Ltd.
Electrical and Mechanical Engineers
Northgate - - - - Brisbane



Manufacturers of Complete Layouts and Junctions for Railways and Tramways, Dog Spikes, Rivets, Bolts, Nuts, etc.

Steel, Iron, and Brass Castings, Electric Welding, etc.

We Specialise in the Manufacture of
Bridge Ironwork, including Pile Shoes, Rings, Fishplates, Bolts, Washers, Deck Spikes, etc.

Quotations for your Requirements Promptly Submitted.

Telephones:
M 1131 and M 1132.

Telegraphic Address:
McKenzie Holland
Nundah, Queensland.

SOME EXTERNAL PARASITES OF POULTRY.

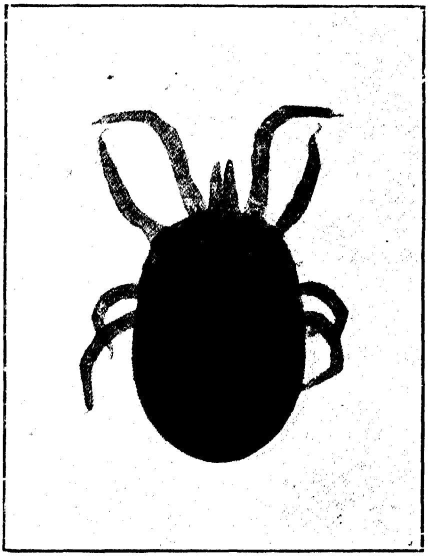
By P. RUMBALL, Poultry Expert.

From the investigation of various troubles affecting poultry one is forced to the conclusion that many breeders do not realise the serious effect that parasites have upon poultry. Parasites not only reduce the egg yield, causing at times the birds to be entirely unprofitable, but so undermine the general health of the birds that the latter become so weakened that they fall ready victims to all classes of disease.

Whenever fowls appear out of condition the first thing the breeder should ascertain is whether they are infected with parasites, and if such is the case, take measures to free the birds.

There are both internal and external parasites of a serious nature to which poultry are subject. An article upon internal parasites appeared in a previous issue of this Journal, copies of which may be had free upon application.

Among the external parasites we have those which live upon the bird itself during the whole of its life and those that live in the poultry buildings during the day, coming out at night to prey upon the birds. Among the latter type of external parasite is the poultry tick and the red mite. The tick is of such a serious nature that it has been the subject of an article also in a previous issue, copies of which are available free upon application.



From Victorian "Journal of Agriculture."]

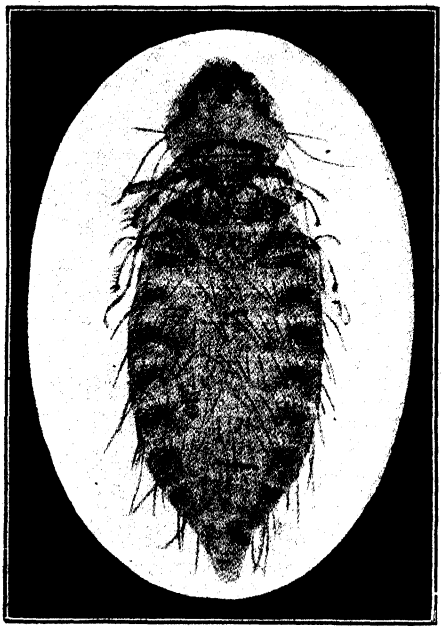
PLATE 168.—RED MITE. (MAGNIFIED 38 TIMES.)

The Red Mite.

This pest is probably second to the tick in importance as an external parasite. It is only red in colour when engorged with blood; when not engorged it is yellowish, greyish, or almost transparent. It hides by day in the cracks and crevices of the fowl house, nest boxes, &c., living in colonies. Where mites have congregated for a considerable time a mealy dust will be found, and around the crack or crevice of their hiding place will be noticed black and white specks, the excrement of the mite. The red mites usually only feed at night upon the body of the bird, but where infestation is severe they will be noticed upon the broody hen both night and day. The presence of considerable numbers will cause the birds to become droopy, weak, and their combs and faces pale. This is due to the loss of blood and broken rest of the birds. The egg yield, under such conditions, will be materially reduced, and the stock in a fit state to fall ready victims to disease organism. The complete life cycle of the red mite from egg to adult stage takes only seven days, and when this is coupled with the fact that the mite will live for four to five months the rapidity with which they increase will readily be understood.

Treatment consists in preventing the multiplication. In most cases where only a few mite are present they will be found under the perch where it rests on the perch supports. Perches should therefore be moveable and not nailed as is frequently the case. They should also be of timber with as few cracks as possible. Under these conditions it is then possible to lift the perches once a week and treat under them with a suitable preparation for the destruction of the mite. Pure kerosene is very effective, but a heavier oil is to be preferred, such as wood-preserving oil. If infestation is severe the mites may be distributed throughout the whole of the house and even among accumulated droppings under the perch. Under such conditions everything moveable should be removed and all wood work treated, the house thoroughly cleaned of loose earth and droppings, and a good spraying given with a kerosene emulsion to the whole of the interior. Even under this system of treatment some mites will escape, and the practice should be repeated at intervals of a week until the premises are freed from their presence.

To make the emulsion, boil up a pound of good soap in one gallon of water. When boiling remove from the fire and add one gallon of kerosene, stirring well and so thoroughly emulsifying the mixture. To this can be added another eight gallons of water.



From Victorian "Journal of Agriculture."

PLATE 169.—COMMON LOUSE OF THE FOWL. (MAGNIFIED 37 TIMES.)

Scaly-leg Mite.

The mite which causes this trouble is very common in Queensland, and is responsible for that unsightly scaly leg so frequently noticed among flocks of poultry. Its presence is easily detected when in sufficient numbers to cause trouble. The mite burrows under the epidermic scales on the surface of the leg and upper surface of the feet. The scabs become loosened and elevated by the formation of a whitish crust beneath them and the leg assumes an enlarged, roughened appearance. The trouble runs a very prolonged course, usually beginning between the toes. Unless treated the disease continues to progress and the birds become lame, at times only moving with difficulty; they lose flesh, their plumage lacks lustre, and death may follow from exhaustion.

The mite causing this trouble is known as *Sarcoptes mutans*. It is a strictly contagious disease, although not one that spreads rapidly from bird to bird. Stock hatched and reared by broody hens affected with the trouble rarely escape infestation, while with those artificially hatched and reared, although coming in contact with infested stock in later life, the trouble does not assume such serious proportions. The mite lives on the juices of the leg, causing irritation and consequently a multiplication of the cells of the part and an exudation of serum, and it is from the union of these two products that the white powdery crust is formed.

Treatment consists in the application of a preparation that softens the scale and destroys the mite. If the legs of birds have been allowed to become very bad they should be washed in warm soapy water. This washing, especially if the leg be scrubbed with an old tooth brush, removes much of the powdery scale. In washing, however, care should be taken not to tear any scab off and cause the leg to bleed. After drying the legs may be treated with a good coat of any of the following:—

1. One part kerosene and two of olive or cotton seed oil.
2. Equal parts sulphur and lard.
3. 6 per cent. carbolic oil.
4. Carbolised vaseline.

The disease is not a difficult one to cure and when once eradicated from the farm, providing the mite is not reintroduced by affected purchases, there is no fear of reinfestation of stock taking place. When infestation is not severe no preliminary washing is necessary if the kerosene and oil treatment is used.

Depluming Mite.

This mite burrows into the skin near the base of the feathers, causing intense irritation and the feathers to become broken off close to the skin or to be entirely shed. This mite does not suck the blood, but subsists on the waste matters of the skin and feathers. Infected birds usually have a very ragged appearance, and the irritation frequently leads the birds to pluck their feathers and eventually cause the vice of feather eating.

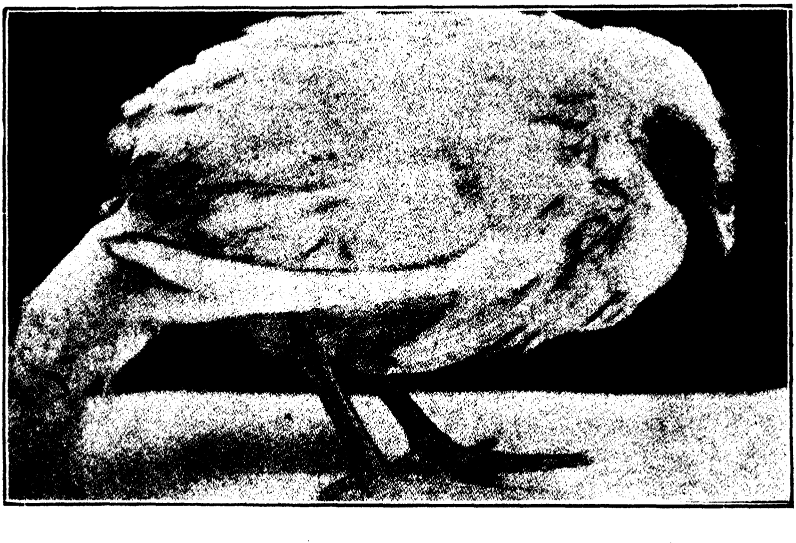


PLATE 170.

This seven-weeks-old Single Comb White Leghorn cockerel is suffering from an attack by head lice. Note the unkempt plumage, dark, dried comb, eyes closed and general dejected appearance.

Treatment.—As the trouble is contagious, affected birds should be dipped and isolated as soon as noticed and the premises or pens disinfected. A suitable dip for this purpose consists of sodium fluoride ¾oz., flowers of sulphur 2 oz., a good household soap ½ oz., and one gallon of water. This mixture, as well as curing the trouble, will also destroy all forms of bird lice. If dipping cannot be resorted to several applications of lard and sulphur ointment will effect a cure.

It is, however, not desirable to dip a flock of birds that are in full lay, as the shock will assuredly cause a serious falling off in egg production, and in many cases the moulting of the birds.

Lice.

These of various species are more common to poultry than is generally thought, but in small numbers, as a rule, cause very little trouble. There are, however, exceptions, particularly with the head lice that affect chickens. This louse apparently has little effect upon the adult bird, but on chickens it causes heavy mortality. Unlike the majority of the parasites previously referred to poultry lice remain on the fowl constantly. There are many species, and in the great majority of cases those affecting fowls will not be noticed on ducks. Turkeys, pigeons, and geese also have species peculiar to them. Lice are not blood suckers like the mite and tick, but live upon the skin and feathers. Their presence is very irritating when in large numbers, and naturally they are not productive to the good health of the bird.

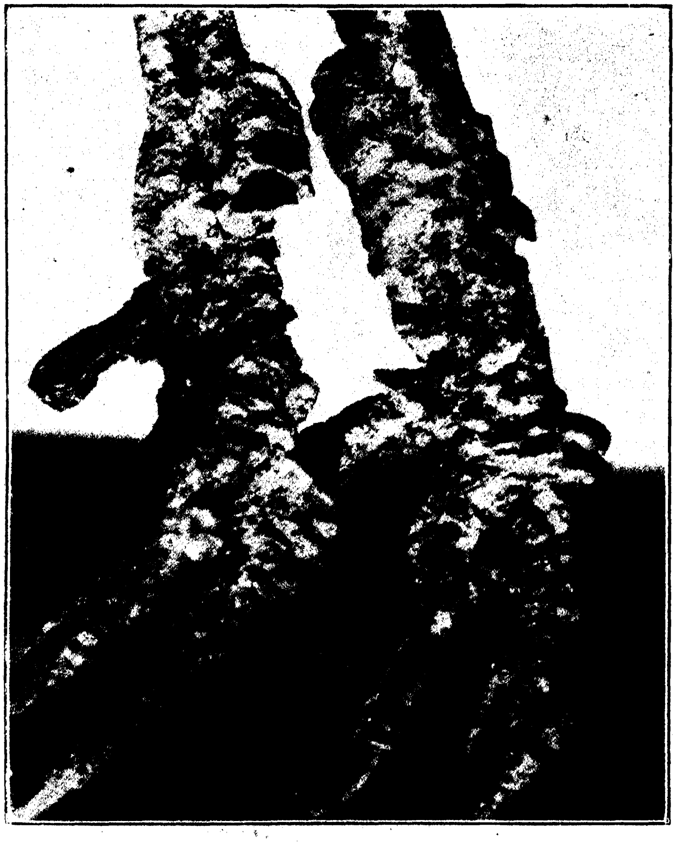


PLATE 171.—ADVANCED STAGE OF SCALEY LEG.

The general symptoms of lice infestation in chickens are droopiness, lowered wings, and ruffled feathers. In adult birds, with the exception of male birds, ill-effects are not shown, but severe infestation will be reflected by a reduced egg yield. Male birds, however, should be periodically examined for lice. They do not dust bath as freely as females, thereby permitting rapid reproduction of lice and consequently severe irritation. In the breeding pens the presence of lice is largely responsible for the lowered fertility of eggs, and male birds should receive regular treatment with some insect powder.

The Head Louse.

This is usually, as the name would indicate, found upon the head of the bird. Heavy losses are caused in young chickens by its presence. It is darkish grey in colour and will usually be found in an upright position along the feathers of the head portions of the bird. If a careful examination is not made its presence may not be detected on account of its size. A few infesting a chicken will cause the chick to become very droopy in appearance with ruffled plumage and hanging wings, and will, if not treated, eventually cause death. With lice of any description in young chickens it is generally noticed that direct contact with adult stock has at some time taken place, therefore it is strongly advised to prevent this contact if possible.

Treatment lies in the direction of destroying the parasite by lightly smearing the head, neck, and under the lower mandible with salad oil. Do not plaster the chick with oil, a light smear applied with the tips of the fingers will suffice. Naturally if the chickens are mothered by a hen she should also be treated.

Other lice are—

(1) *The Body Louse.*—This is a large louse which may be noticed moving quickly about the body, particularly around the vent when the feathers are quickly raised. It is of a dirty straw colour, and the eggs are noticed in heavy clusters at the base of the feathers. These eggs hatch in about a week after being laid.

(2) *The Shaft Louse.*—A small light yellow louse found on the shaft of the feather.

(3) *Wing Louse.*—A dark grey louse, elongated in shape, found on wing feathers and moves very slowly.

(4) *Fluff Louse.*—A small louse found among the fluff of birds.

The treatment in all the above cases is prevention. A good dust bath will generally keep lice down to numbers that will cause little or no ill-effect to the birds. This dust bath could be composed of fine road dust and wood ashes. Flowers of sulphur may be added, also a sprinking of slacked lime, but if the dust is sufficiently fine, and occasionally moistened to induce birds to dust during the warmer weather, it will generally suffice.

Fleas.

In Queensland the most serious flea to poultryman is unknown. It, however, is common in Western Australia, and every care is being exercised to prevent its introduction into States not troubled with the pest. The flea is termed "Stickfast," and evidently takes its name from its habit of clinging tightly to the head, face, wattles, and lobes of birds. It is a blood-sucking insect, and its presence has been responsible for heavy mortality among flocks in countries where it is known. There are, however, many varieties of fleas in this State, and the writer has noticed fowl yards and houses infested sufficiently heavy to cause inconvenience to the producer concerned.

The thorough cleaning of premises in such cases is recommended and a good spraying with kerosene emulsion. As a general rule a flea lays its egg on the ground. Small grubs hatch from the eggs and undergo a portion of their life on the soil, feeding on organic matter, and from the cocoon stage emerge as fleas, hence the necessity of thorough cleaning of pens.

A USEFUL AND RELIABLE JOURNAL.

An L.P.A. Secretary (Atherton Tableland) writes:—" I am getting to be an old subscriber now. . . . The Journal is a great help to me in the Secretaryship of the Local Producers' Association here, seeing that it gives all the official information which can be quoted when any subject crops-up needing confirmation. The 'Agricultural Journal' gives information to the farmer leaders which can be relied upon for use at farmers' meetings. . . ."

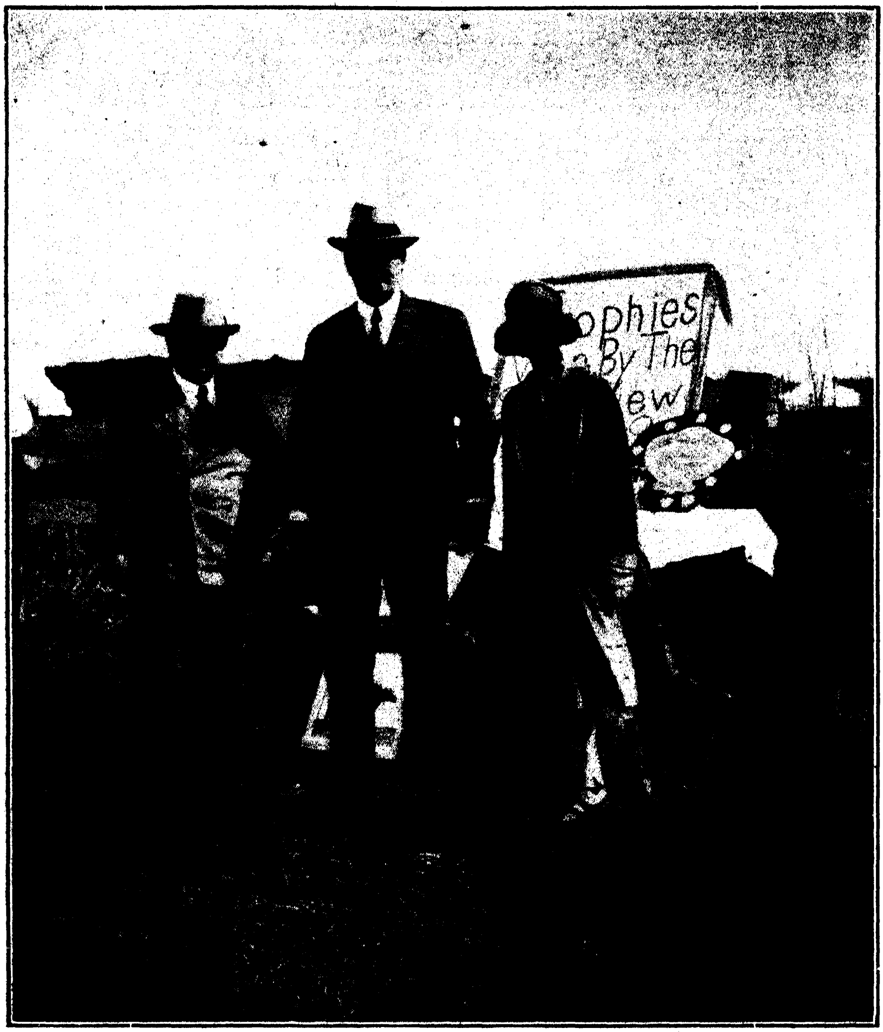


PLATE 172.—THE HOME COUNTRY AND THE DOMINIONS REPRESENTED ON A SOUTH BURNETT FARM.

In the group are the Right Hon. L. C. M. S. Amery, M.P. (Secretary of State for the Dominions and Colonies in the British Cabinet) and Mrs. Amery, with their host, the Hon. William McCormack (Premier of Queensland), at a wayside halting place.

In the course of their recent tour through Southern Queensland Mr. and Mrs. Amery and their staff saw something of a dominion in the making. They travelled through some of the most fertile provinces in the whole Empire. On the Darling Downs they saw a limitless sweep of waving wheatfields—a boundless sea of full-eared grain ready for the harvest. On the near North Coast they saw the wealth of our dairy lands; our orchard lands on the ranges, where man's industry and nature's artistry happily combine; banana plantations on buttressing spurs in belts of deep dark green, merging into the lighter shades of sugarfields that spread wide to the ocean's margin—an edging of golden sand and silver surf, the long wash of the blue Pacific. And in the South Burnett they saw a land that had emerged from the primitive to the practical, from rich promise to ripe fulfilment, in a short span of twenty years, and where are exemplified all the fine characteristics of a pioneer people and other strong qualities that go to the making of our race.

TYRE LIFE—HOW TO PROLONG IT.

Every year, literally, millions of miles of tyre service are lost through the failure of car owners to take care of their tyres.

Once the causes of the effects of the various tyre abuses are fully understood, the care of tyres is really so simple there is no excuse for car owners not getting out of them all the mileage the manufacturers have built into them.

Summarised the more important points for owners to pay attention to if they wish to get full value out of their tyres are:—

(1) Proper pressure, according to the schedules already published, must at all times be maintained, with the possible exception that when one strikes a very soft or sandy patch over which one wishes to drive one's car the pressures may be temporarily reduced in the back tyres, so as to give greater tyre surface in contact with the ground, and, therefore, greater tractive force can be exerted. As soon, however, as one has got out of the soft ground the tyres should be at once pumped up to their correct pressures again.

(2) A reliable tyre gauge is an absolutely indispensable part of a motorist's equipment. It should always be carried on the car, preferably in one of the pockets where it can readily be got at when required. Most makers supply two kinds of gauges—one for high pressure and the other for balloon tyre—and the car owner will naturally procure the kind to correspond with the type of tyres he is using. The tyre gauge should be used on all tyres, including the spare, at least once a week, and if any tyre is found not to be holding its pressure well the cause should be sought for and the defect immediately remedied, either by the owner, if capable, or by a reliable tyre expert.

(3) Correct wheel alignment is absolutely essential for long tyre life, and the slightest signs of tread wear, owing to faulty alignment, should be constantly looked for, and the fault corrected immediately it develops.

(4) Tread cuts, if they make an appearance, must be promptly repaired.

(5) Care in driving, such as in the application of brakes, and in keeping the side walls of the tyres from rubbing against the kerbs, will save many pounds in tyre wear.

(6) Next in importance to the care of the tyres themselves is that of the rims upon which they are mounted.

(7) In the case of motor vehicles which are habitually overloaded so that the total weight borne by the tyres is greater than that for which the makers have made them, these tyres should be replaced by over-size ones, designed to carry such weight.

(8) Last, but not least, see that your spare tyre is always ready to put on the minute that it is required. Never, under any circumstances, run a flat tyre after you have discovered that it is in that condition. If you do so you may easily damage both tube and casing beyond repair.

PROBLEMS OF MOTORISTS.

Often the anchorage bolts of motor supports work loose, causing annoying squeaks, motor pounding, and inexplicable vibration. Apply lubricating oil to the base of the supports, and pull the bolts up as tightly as they will go, making sure each nut is securely fastened with a cotter pin or lock washer.

Brake Rods.

The parts under the car that will rattle may usually be located by shaking them. If the brake rods are loose they can be prevented from rattling by supporting them in the centre with a length of coiled spring, properly attached to the frame. If the lubrication grooves in the spring shackle become clogged, the oil may be unable to reach the surface where it is needed. It is often good policy to remove the shackles and run a pipe cleaner or a piece of wire through the lubrication recess to remove all foreign substances and oil or grease. When replacing the shackle bolt thoroughly oil the surface, and if possible rotate it as it is replaced. Many distressing squeaks and rattles may be traced to the improper lubrication of spring shackle bolts.

Springs.

Unless the springs have been designed for lubrication, they should not be oiled, as they will function better in their original condition. The dry surfaces of the leaves tend to slow the action, and prevent rebound. The Buick Motor Company has sent letters to its dealers and distributors all over the world cautioning them against lubrication of the springs. The Cadillac Motor Company supplies one model equipped with spring gaiters packed with grease, but that chassis is for a special purpose, and is provided with shock absorbers to prevent sudden recovery of the springs.

Rim Lugs.

Rim squeaks, due to loose rim lugs, may be quickly overcome by applying a small quantity of oil or graphite grease to each lug bolt, and tightening each to its capacity. To be sure of an even tension on the tyre rims, it has been found advisable to tighten the bolts strictly opposite each other, and then to tighten each to its capacity in a clockwise manner. Oiling the bolts and nuts greatly facilitates tyre changing.

Wheels.

Creaking wheels are often caused by the drying of the wooden spokes. A few drops of kerosene allowed to work into the joints will restore them to proper condition. That suggestion has been handed down from the days when it was a practice to run the carriage into a creek to swell the wheel spokes. The action of the kerosene oil is more lasting, however, than that of water.

Steering Gear.

Turn the steering wheel from full left to right, lock, and see that all bearings are properly lubricated. Some steering mechanisms are more complicated than others, but if the car is equipped with a Jacox steering gear, such as is used on Cadillac, Oakland, Pontiac, Oldsmobile, and Buick, any backlash which may be the cause of annoying rattles may be easily removed by a slight tightening of the large adjusting nut at the top of the box. The adjusting nut is held in position by a pinch bolt, which must be loosened before an adjustment can be made. After the proper setting has been obtained, the pinch bolt should be retightened, so that the correct adjustment will be maintained.

TUNING UP A SLUGGISH ENGINE.

Most motorists think it is a most difficult job to undertake to tune up their engines and give them that vim and kick that is associated with the touch of an expert. Its original snap has only disappeared because of valve sluggishness. This is caused by stickiness in the valve guides. Take the valves out; clean the guides and then grind the valves in with the usual valve-grinding compound.

Sometimes it is entirely due to tightness of the valve-stem in the valve-guide, and this particularly applies to the exhaust valve. The material from which modern exhaust valves are made has a tendency to grow under the effect of heat. Closely examine the stem of the exhaust valve, and if there is the slightest appearance of binding, polish the stem by sliding emery cloth up and down; treat the valve-guide in the same manner, and it will be found that the usual snappiness is restored. Should, however, this fail, examine the contact-breaker; carefully clean the points, and see the breaker arc is not sluggish. Sometimes the fibre bearing in which the bell crank works swells, and temporarily grips the breaker arm. This makes for sluggishness that is hard to trace. The moral is: Make all the moving parts of the contact-breaker as free as possible.

Another point to watch is to see the points of the breaker are perfectly clean. With platinum points this is a secondary consideration, but with tungsten points it is of vital importance. Tungsten is a substitute for platinum—unfortunately, not because it is, in any state of form, superior, but because it is cheaper. In use it causes difficult starting and sluggishness, unless the points of the breaker are kept perfectly clean. If you can afford it, use only platinum points.

ENTHUSIASTS IN PIG RAISING.

[See opposite page.]

This photograph was taken recently on the occasion of a visit of inspection to the Queensland Co-operative Bacon Association's Factory at Murarrie by a party of boys, recent arrivals in Queensland, under arrangements organised by officials of the Salvation Army. The lads, all of whom are standing in this photograph, are migrants who were at the time undergoing an initial course of training on the Farm Home for Boys at Riverview, near Brisbane, preparatory to their going out as workers on Queensland farms. The officials in the foreground, reading from left to right, are :—Major D. S. Alexander, Superintendant of the Army Farm; Mr. J. Winders, understudy in Mr. Shelton's office; Mr. E. J. Shelton, Instructor in Pig Raising, and Mr. F. Bostock, Assistant Instructor in Pig Raising; the latter gives a series of lectures and practical demonstrations at the Riverview Farm each half year, or as required, and finally conducts an examination at the end of the term. In this way a very useful and practical work is being carried out, the visit to the bacon factory being part of the scheme.

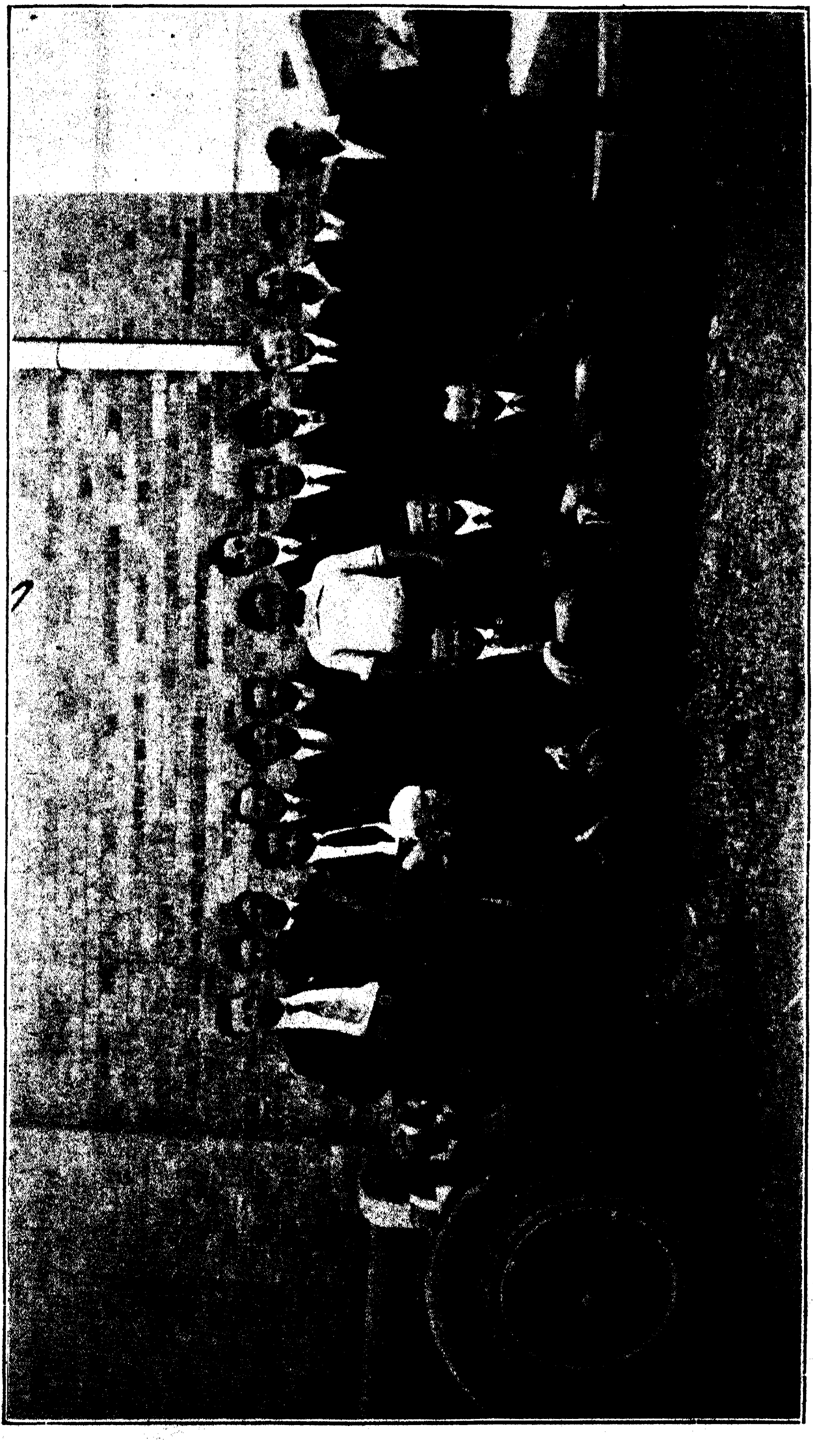


Plate 173.—Group of Interested Enthusiasts in Pig Raising.

[For description of Plate, see page 640].

PLATE 174.—ENTHUSIASTIC MEMBERS OF THE MERLWOOD-CLOYNA DISTRICT PIG CLUB, 1927.

It will be noted that girls as well as boys, and children of varying ages, are interested in this progressive scheme, and that they are all believers in "Better Pigs on Every Farm." The photograph was taken on the occasion of a Club visit to the home of two Club members, at Messrs. H. Shelton and Sons' Farm, Merlwood. The two larger pigs were entered in the Club contest. Note also the clean, healthy surroundings, such as is necessary in all branches of stock raising, and the fine, healthy enthusiastic children of which Queensland is proud.

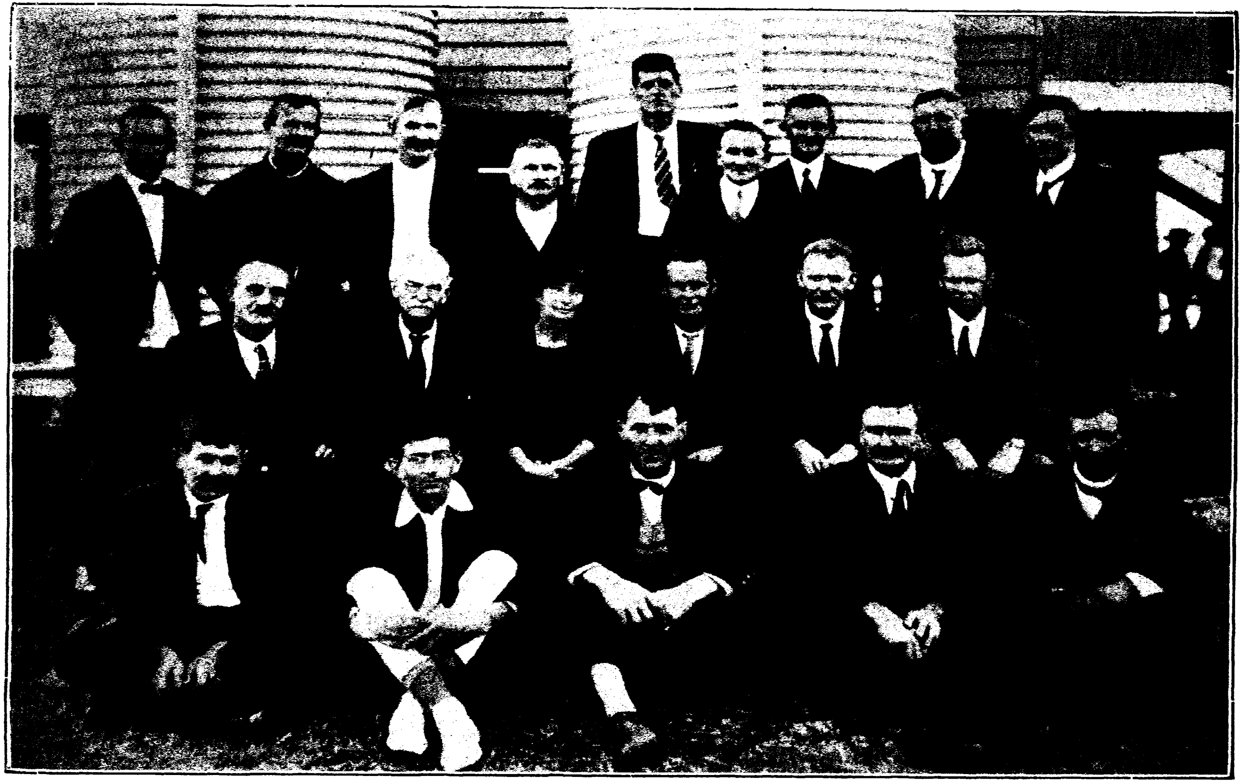


PLATE 175.—THE JOINT COMMITTEE AND JUDGES OF THE PIG CLUB, MERLWOOD-CLOYNA DISTRICT, QUEENSLAND.

All enthusiasts in Pig Club and other progressive schemes for the advancement of the district. This photograph was taken on the occasion of the Club contest in April, 1927. The same Committee was responsible for organising another equally successful Club contest with 37 members, and in connection with which a combined Pig Club Show and School Féte were held at Cloyna School, November, 1927.

A TON OF PORK IN SIX MONTHS FROM ONE LITTER.

AN AUSTRALIAN RECORD.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Just what does it mean when we refer to "A Ton of Pork in Six Months from one Litter" and when we refer to it as "An Australian Record?" It means just simply that the total live weight attained by this sow's litter of pigs—all but one of the pigs reared from the one farrowing—when less than 180 days old, scaled more than what we commonly accept as one ton, i.e., 2,240 lb., frequently in the trade called a "long ton" (as against 2,000 lb. spoken of as a "short ton" when dealing with the weight of pollard and other concentrates).

The litter of Gloucester Old Spot pigs to which reference is made in this report have created a new Australian record in this direction by attaining a total live weight—eleven pigs in the litter—of 2,314 lb. at the age of 23 weeks and 3 days, or approximately one week or more short of six months.

Writing in regard to this record-breaking litter, the breeders, Messrs. Russell and Johnston, of "Brechin," Bete Bolong, Orbost, Victoria, have this to say:—

> "The particulars we send you herein are the records of the weights, gains, &c., and the rations used in producing our Gloucester Old Spot Ton Litter in under six months. We think you will agree that this performance is a feather in the cap of this old world breed. We would very much liked to have had the opportunity of showing you the litter, for we are sure you would have been very enthusiastic over them. The Better Farming Train was in Orbost last week (October, 1927) and by special request we penned the pigs in the railway yards. Mr. Archer and his fellow-officers from the Victorian Department of Agriculture were very interested, and the former went so far as to say in his lecture that the Gloucester Old Spot breed would cross very well with the large White Yorks."

The special report which follows, supplied by Mr. J. Cowper-Johnston, a partner in the firm, details the methods followed, foods used, and results obtained. We pass this information on for the benefit of readers generally.

NOTE.—This record compares very favourably with what is referred to in America as the "World's Record Litter" of pigs—seventeen pigs in all in one litter which when 180 days old weighed 5,117 lb. They were Poland-Chinas, bred and fattened on the farm of the W. T. Rawleigh Company, Freeport, Illinois, U.S.A., and to which previous reference has been made in this Journal.—ED.

A GLOUCESTER OLD SPOT TON LITTER.

In producing a Ton Litter within six months, the object in view was if possible to give prominence to the many very excellent qualities of the Gloucester Old Spot breed of pigs. It is rather unfortunate that having been successful, the swine fever restrictions should prevent the publicity which exhibiting at the Melbourne Show or offering for sale in the open market would have secured. However, the accompanying records of weights, gains, and the rations used during the twenty-three weeks should give a very good idea of what the breed is capable.

Although the Gloucester Old Spot is the first breed to produce a Ton Litter in Australia, it must not be thought that it is the only breed that is capable of such a record; other breeds can, and no doubt will, emulate the Gloucester Old Spot, but they will have difficulty in beating the litter in question, the type, conformation and quality of the whole eleven pigs being of such an exceptionally high standard.

The conditions under which the experiment was carried out were far from ideal. Wintry weather was experienced with extraordinary frosts day after day, raw bleak days and 7½ inches of rain in a week retarded progress and, of course, increased the amount of food consumed. Again, the loss of No. 95 increased the length of time taken to produce the ton and helped to raise the cost of producing it. The late castrating of the boars must have also helped to keep the litter back. It was at first intended that the boars should be kept, but when it was realised that they might interfere with the experiment they were operated on.

There is no doubt that given more favourable conditions the cost per pound would be considerably reduced and the time taken shortened.

Much has been heard in Victoria of the quality of the pollard supplied to many pig raisers. In this case, the pollard was obtained from three different sources. The results show plainly the quality of the article supplied. It might be as well to mention here that although the dam of the litter was able to consume a relatively large amount of bran and to good effect, this is not so with all sows; in fact, many are unable to digest a quarter of the amount quoted.

That the Gloucester Old Spot pig is an ideal one for the farmer is undoubted, and it is certain that when the breed is better known it will become very popular with farmers. Gloucester Old Spot pigs are exceptionally hardy, very quiet, and good feeders, giving a maximum of gain at a minimum of cost. The sows are excellent mothers, producing and rearing large litters of great size. Piglets weighing 6 lb. at birth are quite common. The boars are exceedingly potent, and when used on any of the other breeds the resultant cross is a most taking one. No breed of pigs causes less trouble on the farm, a very poor fence will hold them and the boars cause no trouble. A strong point in favour of either the pure Gloucester Old Spot or the cross is, that if fed right and kept going from birth, they mature very early and consequently are very suitable for the butcher as well as for the curer, and they weigh exceptionally well.

Some critics say that the bone of the Gloucester Old Spot pig is heavy and coarse. This is far from being a fact, and an outstanding feature of the Ton Litter, apart from its conformation, is the quality and fineness of the bone.

That the breed has excellent bacon qualities is borne out by the results in the recent competitions in England. For the second year in succession the Gloucester Old Spot breed won the Whitley Cup for the best bacon from six pigs, with 100 marks. Again, in the Beale Cup, a class for two pedigreed pigs, in which four Large White Yorks, one Berkshire, and two Gloucester Old Spot entries competed, the "Spots" took first and second places with 98 and 86 marks respectively. Surely a breed that can put up a performance such as this must be worthy of a place in helping to build the export bacon trade to England, which we are told is so essential to the pig-raising industry of Australia.

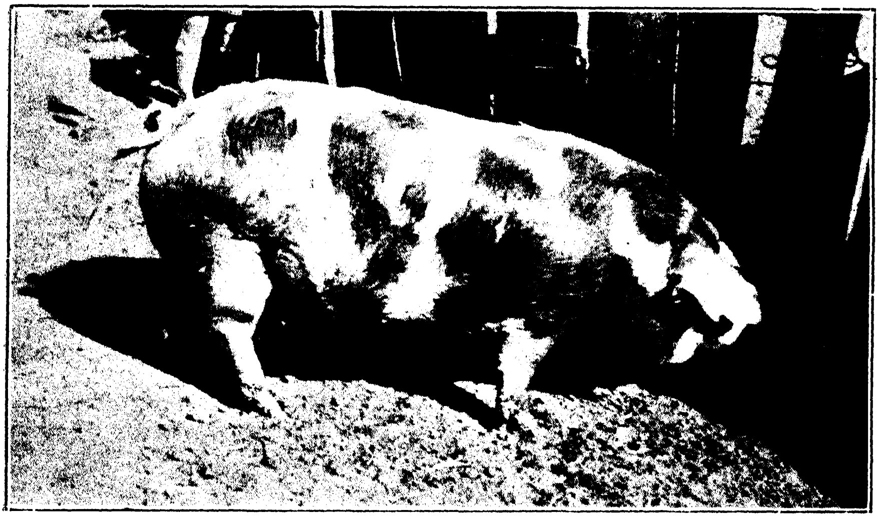


PLATE 176.—GLOUCESTER OLD SPOT SOW, NO. 87 IN TON LITTER, WHEN TWENTY-THREE WEEKS AND THREE DAYS' OLD. LIVE WEIGHT, 246 LB

Note compact deep body, deep and capacious chest and broad meaty ham. Though less than six months' old she has exceeded prime bacon pig weight by almost 70 lb. It pays to breed and feed the best and the best only. Mongrels would not attain this weight in eighteen months if they attained it at all. The departmental slogan, "Breed more and better pigs on every farm," is strikingly evidenced in this picture.

In conclusion, it may be said that if there is one thing more than another to be learnt from raising the Ton Litter, it is that rearing pigs is a payable proposition when they are fed right and kept going from start to finish. The practice of rearing pigs and just letting them grow till they reach bacon stage and then fattening them is, apart from the resultant inferiority of the meat, a most expensive one and must, in most cases, cost more to produce than is realised for the finished article.

PARTICULARS OF RATIONS FED TO G.O.S. (TON) LITTER AND DAM.

Weeks.	——	Pollard.	Bran.	Barley.	Milk.	Remarks.
		Lb.	Lb.	Lb.	Gal.	
1	Sow	35	21	..	35	Pollard soaked in water, making with milk one kerosene tin night and morning.
	Litter*	..	..	..	..	
2	Sow	35	21	..	35	
	Litter*	..	..	..	..	
3	Sow	35	21	..	35	Suckers commenced sampling sow's ration at 3 weeks old
	Litter	..	..	..	..	
4	Sow	73	28	..	35	Suckers allowed run in yard, progress not satisfactory, weather exceptionally cold, heavy frosts.
	Litter	..	..	..	..	
5	Sow	73	28	..	35	Barley brought to boil and allowed to steam, ration mixed with milk and pollard and fed middle day apart from sow.
	Litter	10	..	28	7	
6	Sow	73	28	..	14	
	Litter	21	..	28	14	
7	Sow	73	28	..	14	Pollard fed night and morning, barley middle day.
	Litter	42	..	42	28	
8	Sow	73	14	..	14	
	Litter	42	..	42	28	
9	Sow	73	14	..	14	Suckers looking for more; benefit of increase is shown in gain for tenth week.
	Litter	111	..	56	28	
10	Sow	63	..	..	14	Suckers shut off from sow part of day and allowed run in patch of lucerne. Scoured very badly and lost weight so reduced barley and cut out lucerne.
	Litter	122	..	70	91	
11	Sow	63	..	..	14	
	Litter	122	..	70	91	
12	Sow	63	..	..	14	Litter only allowed with sow nightly.
	Litter	131	..	70	91	
13	Sow	63	..	..	14	
	Litter	131	..	70	91	
14	Sow	..	..	..	..	Weather very hard; frost almost daily; litter weaned.
	Litter	192	..	70	98	
15	Sow	..	..	..	..	Very wet week; 7½ inches of rain.
	Litter	192	..	98	98	
16	Sow	..	..	..	..	Litter also receiving half-tin maize cobs middle day.
	Litter	245	..	98	98	
17	Sow	..	..	..	..	
	Litter	270	..	98	110	

* Litter suckling sow only.

Particulars of Rations Fed to G.O.S. (Ton) Litter and Dam—*continued.*

Weeks.	—	Pollard.	Bran.	Barley.	Milk.	Remarks.
		Lb.	Lb.	Lb.	Gal.	
18	Sow ..	..	..	..	..	No. 95 pig died previous week. Pigs unable clean up, so ration reduced.
	Litter ..	251	..	98	101	
19	Sow ..	..	..	..	..	Extra half-tin maize given at night.
	Litter ..	251	..	98	101	
20	Sow ..	..	..	..	..	Pigs could not manage extra maize, so it was cut out of mid-day feed.
	Litter ..	332	..	98	140	
21	Sow ..	..	..	..	..	
	Litter ..	332	..	98	140	
22	Sow ..	..	..	..	..	Several of the sows in litter in season and it was rather a wet week, so results were not quite up to the mark.
	Litter ..	332	..	98	140	
23	Sow ..	..	..	..	..	Ton litter realised.
	Litter ..	332	..	98	140	
24 weeks and 3 days	Sow ..	..	..	..	..	Litter finally weighed 26th September by Mr. Bird and an officer from the Department of Agriculture, Melbourne, Vic.
	Litter ..	141	..	42	62	
25	Sow ..	..	..	..	..	
	Litter ..	..	..	..	..	
	Totals..	4,397	203	1,427	1,947	

Cost of Food Purchased stated at Melbourne Prices.

	£	s.	d.
Pollard, 4,397 lb. at 1s. 9d. per bushel	19	4	9
Bran, 203 lb. at 1s. 8d. per bushel	0	16	11
Barley, 1,427 lb. at 4s. 6d. per bushel	6	8	3
Milk, 1,947 gallons at 1d. per gallon	8	2	3
Maize (cobs), 5 bags at 7s. per bag..	1	15	0
	£36	7	2

Total cost of producing 2,314 lb. of pork (including keep of sow) for 13 weeks £36 7s. 2d., as per figures supplied by Messrs. Russell and Johnston, "Brechin," Bete Bolong, Orbost, Vic.

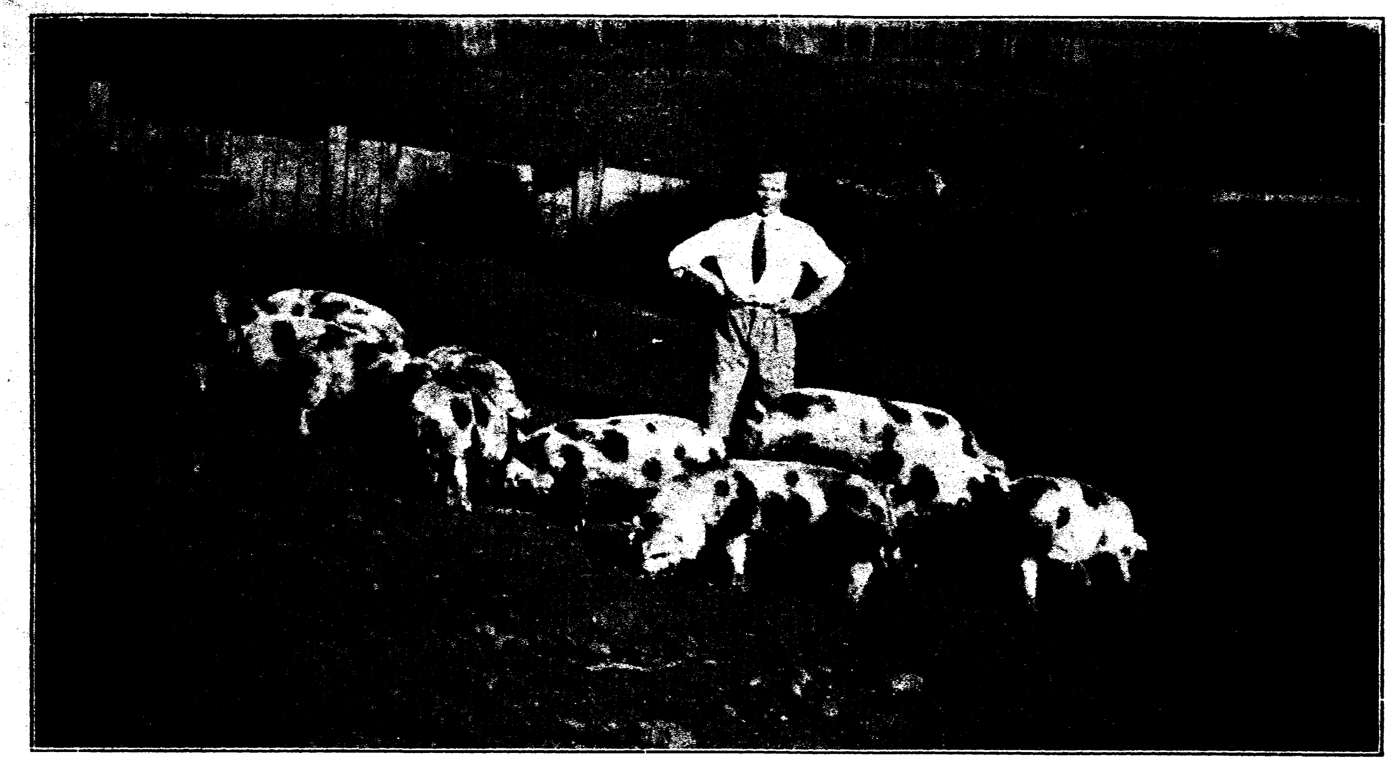


PLATE 177.—THE RECORD-BREAKING LITTER OF GLOUCESTER OLD SPOT PIGS, THE PROPERTY OF MESSRS. RUSSELL AND JOHNSTON, OF "BRECHIN," BETE BOLONG, VICTORIA.

This litter of pigs weighed under Government supervision at twenty-three weeks and three days' old, live weight, 2,314 lb. The photograph, in which the mother of the pigs is shown, was taken when the pigs were sixteen weeks' old or some seven weeks before the completion of the test. This is the first occasion in Australia on which a ton litter has been produced under similar conditions under six months of age.

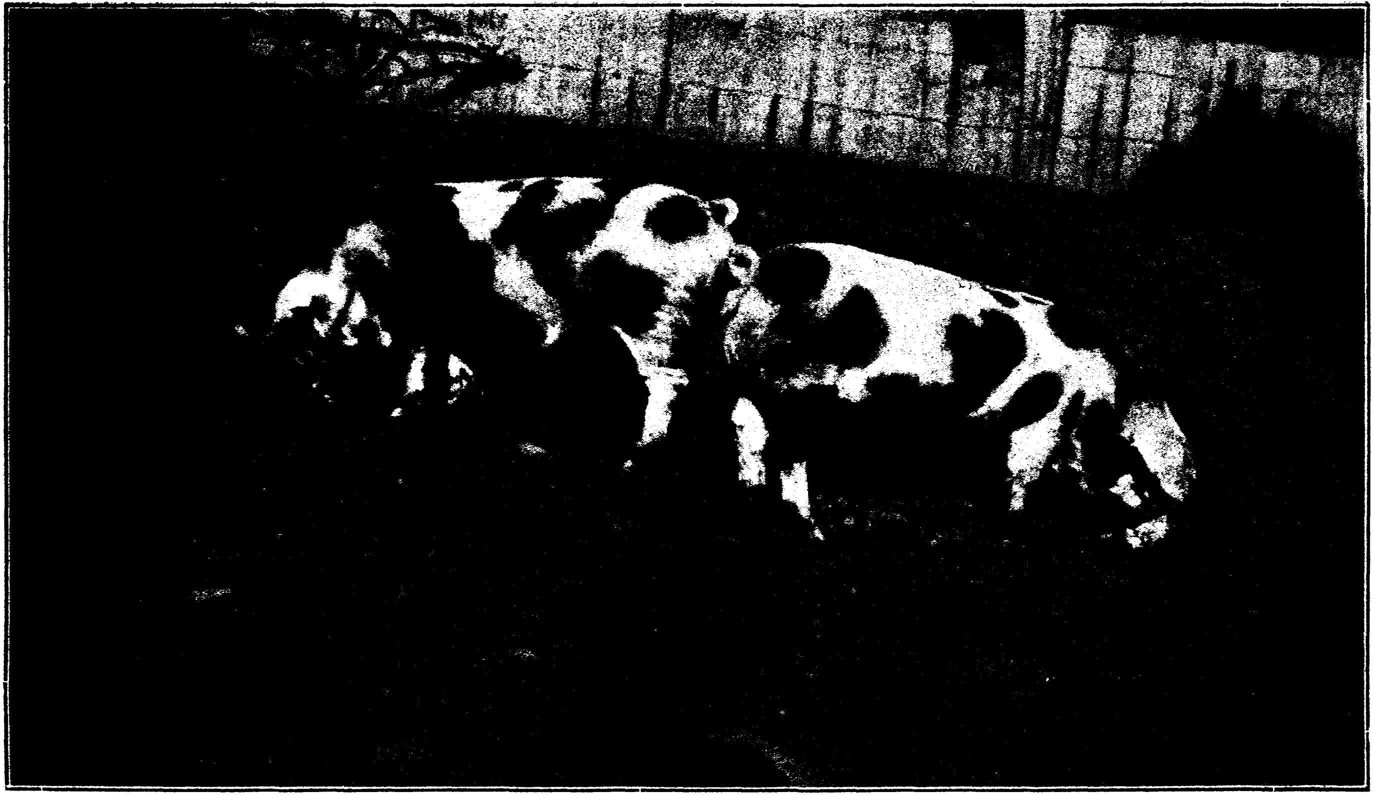


Plate 178.—Gloucester Old Spot Sows, Nos. 87 and 90, Members of the Ton Litter, at Sixteen Weeks of Age.

Note exceptional quality, evenness of-type, length of body, and plump well-filled hams. Pigs of this quality would realise top prices in any market. They are certainly exceptionally well developed animals for their age.

PARTICULARS AND WEIGHTS OF GLOUCESTER OLD SPOT LITTER.

Farrowed, 14th April, 1927; Number in Litter, 14; Number Reared, 12; Average at one day old, 3·68 lb.
Dam—" Brechin Faith," No. 38. Sire—" Brechin Pride," No. 41 (A.S.P. Herd Book).

Earmark and Sex of Pigs.	Weeks.											
	1	2	3	4	5	6	7	8	9	10	11	12
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 87 Sow	7·0	13·0	18·5	24·0	31·75	37·5	43·5	54·0	64·75	77·0	88·75	96·5
No. 88 Sow	7·75	12·0	17·5	21·75	29·0	33·5	41·0	45·5	55·5	65·25	73·0	84·25
No. 89 Sow	4·5	8·25	12·0	15·0	18·5	22·5	28·0	35·0	44·5	54·25	63·0	68·5
No. 90 Sow	6·0	10·5	14·0	18·0	25·5	30·5	37·0	42·0	54·0	55·5	72·5	86·5
No. 91 Sow	7·75	8·0	11·5	13·25	18·75	21·0	25·0	31·0	36·5	46·5	57·0	67·0
No. 92 Sow	7·75	13·5	18·0	21·0	27·0	33·0	38·0	44·5	52·0	63·0	74·0	81·5
No. 93 Sow	6·5	9·5	14·0	16·0	22·5	26·0	31·25	36·0	43·0	53·0	59·5	70·5
No. 94 Boar	8·0	12·5	17·5	21·0	27·75	32·5	41·0	44·0	53·75	65·0	77·5	79·5
No. 95 Boar	5·0	9·75	13·0	15·5	21·5	24·0	25·25	35·0	35·0	45·0	53·0	58·5
No. 96 Boar	6·25	11·0	16·0	19·0	24·5	29·5	34·5	36·75	45·5	56·5	65·5	76·5
No. 97 Boar	8·0	12·5	17·0	19·5	26·75	31·5	35·0	33·5	39·0	47·25	62·5	73·0
No. 98 Boar	6·0	10·0	12·5	14·0	18·5	22·0	27·5	32·5	40·75	50·5	61·5	63·0
Total Weight	80·5	130·5	181·5	218·0	292·0	343·0	407·0	469·75	564·25	659·75	807·75	905·25
Average Weight	6·7	10·87	15·12	18·16	24·33	28·6	33·93	39·14	47·02	57·47	67·31	75·43
Average daily Gain in Weight	..	4·11	4·29	3·04	6·16	4·29	5·29	5·22	7·57	10·41	9·75	8·12

PARTICULARS AND WEIGHTS OF GLOUCESTER OLD SPOT LITTER—*continued.*

Earmark and Sex of Pigs.	Weeks.											
	13	14	15	16	17	18	19	20	21	22	23	24 and 3 days.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 87 Sow	111·5	125·5	131·5	148·0	159·5	171·0	187·0	200·5	217·0	222·0	235·0	246·0
No. 88 Sow	91·5	99·0	110·5	118·5	128·5	142·0	155·0	167·5	178·0	191·0	207·5	215·0
No. 89 Sow	82·0	92·5	102·5	111·0	121·5	132·5	145·0	157·5	171·0	182·5	196·0	201·0
No. 90 Sow	95·5	112·5	124·5	133·5	150·0	162·5	177·0	186·0	191·0	203·5	211·5	221·0
No. 91 Sow	77·0	87·0	95·0	106·5	115·5	123 0	136·0	149·0	161·0	169·0	180·0	187·0
No. 92 Sow	92·5	103·5	113·5	124·0	136·0	149·0	164·0	173·0	185·0	196·0	210·0	213·0
No. 93 Sow	77·0	89·5	98·5	113·0	123·0	133·5	150·0	163·5	178·0	187·0	203·0	204·0
No. 94 Boar	91·0	107·0	114·5	125·0	136·5	147·0	162·0	177·5	191·0	200·0	213·0	220·0
No. 95 Boar	61·5	52·0	56·0	61·0	..	..	..	..	..	..	..	..
No. 96 Boar	84·0	97·0	104·0	116·0	125·5	135·0	144·5	159·5	172·0	177·0	185·0	192·0
No. 97 Boar	81·5	96·5	104·5	118·5	130·0	141·0	158·0	172·5	187·0	198·5	210·0	215·0
No. 98 Boar	75·0	87·0	96·0	106·5	116·5	128·0	141·0	155·5	172·0	184·0	195·0	200·0
Total Weight	1,020·0	1,146·0	1,251·0	1,382·0	1,442·5	1,564·5	1,716·5	1,862·0	2,003·0	2,110·5	2,246·0	2,314·0
Average Weight	85·0	95·53	104·25	115·18	131·0	142·22	156·04	169·27	182·09	191·86	204·18	210·36
Average daily Gain in Weight ..	9·56	10·5	8·75	10·91	11·04	11·09	13·81	13·22	12·82	9·77	12·31	6·18

DAILY NOTES ON VARIOUS PIGS AS NUMBERED ON EAR TAGS.

1. Piglets allowed out of sty, exceptionally cold week (fourth week).
2. No. 95 showed signs of rupture, third week.
3. No. 97 attack of scours seventh and eighth week.
4. All boars were castrated, tenth week.
5. Suckers shut out from sow part of day from tenth week.
6. Suckers only allowed with sow at night from twelfth week.
7. Suckers weaned fourteenth week.
8. Very wet and cold weather (7½ inches of rain) fifteenth week.
9. No. 95 suffered from attack of worms fourteenth week.
10. No. 95 injured while being weighed, sixteenth week, and died seventeenth week.
11. No. 90 lame twenty-first week.
12. Several sows in season, wet and cold, twenty-second week.
13. Litter was allowed run in patch of lucerne twelve weeks, scoured very badly, in some cases losing weight to extent of 6 lb. in three days. Cut lucerne out and reduced ration.
14. The litter was finally weighed on Monday, 26th September, by Mr. J. Bird, of Messrs. James and Bird, Stock and Station Agents, in the presence of an officer from the Department of Agriculture, the total weight being 2,314 lb., the age 23 weeks and 3 days.

Owners and Breeders: Russell and Johnston, "Brechin," Bete Bolong, Orbost, Victoria.

MAIZE IMPROVEMENT.

FIELD WORK OF THE DEPARTMENT.

By C. J. McKEON, Assistant Instructor in Agriculture.*

Practically the whole of the year was devoted to work connected with the Departmental seed maize improvement scheme. Although the season was somewhat unfavourable for maize-growing, some very good yields were obtained, and large stocks of selected seed were secured for distribution.

The early part of the season was very dry, very little rain being registered until December, and the early sown crops suffered in consequence. During the latter part of December, and practically the whole of January, very heavy rains were experienced throughout the maize-growing districts, and considerable damage was caused by floods and consequent water-logging of certain classes of soil.

The floods also had the effect of delaying the planting of the late crop, which usually takes place during December, and, as a result, many of the crops in some localities were either wholly or partially spoiled for grain purposes by frosts.

It is gratifying to again be able to report on the improvement in type and yield, and also on the increasing popularity of the departmental varieties, which is shown by the increasing demand for seed, and in the number of successful exhibits at the last National Show which were grown from seed purchased from this department.

It is also satisfactory to observe that the departmental maize improvement work is receiving greater interest from growers, both within and without the State. Inquiries from other countries for stud seed have also been received. Some assistance in this latter respect has been given to the New South Wales Department of Agriculture, which secured supplies of seed for two years in succession of one particular variety—Funk's 90-Day; the standard of quality of our strain of seed now being fairly high as a result of successive years of seed selection work.

The Northern seed maize improvement work, which was started this year with the idea of evolving a suitable type of grain for the Atherton Tableland, has created a considerable amount of interest in that district, and the results so far have been more than satisfactory. The new variety (Durum), on which this Department has been working for some years, gave very promising results, and the type and quality of the grain was very favourably commented on by leading maize-growers in that district.

---

* In the Annual Report, Department of Agriculture and Stock, Q.

SEED MAIZE IMPROVEMENT.

Fairly large areas of the following standard varieties were sown in Southern Queensland—viz., Improved Yellow Dent, Golden Beauty, Star Leaming, Reid's Yellow Dent, Funk's Yellow Dent, and Funk's 90 Day. Although a number of the plots were failures more or less through dry weather, and also later by reason of excessive rain and floods, a large quantity of seed was secured, which, after grading, was sufficient to plant over 3,000 acres. Both type and quality were excellent. During the early part of the season considerable damage was done to several crops by cutworms, and in two instances plots of 3 and 5 acres were completely eaten out.

The damage caused by the maize grub was again very slight. This applies also to weevil, no crop showing damage of any consequence, and it is doubtful if as little damage was done during any previous season. Although the necessity of picking the cobs as soon as possible, particularly those ripening early in the season, has always been impressed on the growers, this could not be altogether responsible for the small amount of damage, for in previous seasons crops have been attacked long before they were fit to harvest. It is thought that the very heavy rains during December and January may have had some effect in checking weevil attack.

Twenty-seven plots, totalling 146½ acres, were sown with varieties named as follows:—

Improved Yellow Dent, 36 acres; Golden Beauty, 19 acres; Star Leaming, 22 acres; Reid's Yellow Dent, 21½ acres; Funk's Yellow Dent, 6 acres; Funk's 90 Day, 36 acres; Eight-row Flint, 4 acres; Cuban Yellow Flint, 2 acres. Total, 146½ acres.

Of these, nine plots totalling 49½ acres were spoiled by floods and excessive rain, two plots totalling 7 acres were completely destroyed by cutworms, and two totalling 20 acres through lack of cultivation and attention on the part of the grower.

Funk's 90 Day.

This is an extremely popular variety and has proved to be a splendid yielder. Five plots were sown, but only one plot of 11 acres and another of 2 acres were harvested, the balance being destroyed by floods and cutworms. The large plot of 11 acres was sown in two areas, one of 9 acres and another sowing of 2 acres a fortnight later. The former received a check from dry weather and rain fell when tasselling was nearly finished. The yield was slightly over 60 bushels per acre. The later sowing received the rain at the right time and gave the very fine yield of 85 bushels per acre.

The field characteristics were very good and continue to show improvement, particularly in the husk covering and evenness in ripening. The type and colour of grain were excellent, and it would appear that as a result of careful selection of stud seed the small percentage of reddish-tinted grain has been practically eliminated. Large stocks of very nice quality seed were secured.

An ear-to-row test plot was planted with the first sowing of the propagation plots and, considering the weather conditions, the results were good. The lowest yield recorded was 47.3 bushels per acre, whilst the highest yield reached 79.3 bushels per acre.

Star Leaming.

Most of the plots of this variety suffered from dry weather during the tasselling period, and although none of the yields was heavy, all gave fairly good results and some very good quality seed was secured. The best yield was between 65 and 70 bushels per acre. The yields of the other plots were not taken owing to damage by cutworms and parrots. The type of grain was very even and the field characteristics were also very good.

An ear-to-row test plot was sown twice, but was destroyed by kangaroo rats on each occasion.

Reid's Yellow Dent.

Four plots were sown with this variety and only small portions of two of these were harvested, the balance, including the ear-to-row test plot, being destroyed by flood waters. These were all well advanced and were very promising looking, one plot in particular which was nearly ready to harvest would have given an exceptionally heavy yield. About 2 acres in one plot and 1 acre in another were on higher land and were only partly damaged. These were harvested and a fair quantity of seed was selected. Owing to the amount of damage done, no yield records were obtainable.

Funk's Yellow Dent.

Both plots of this variety were also practically destroyed by floods and only about 20 lb. of seed for further plot work was secured.

Improved Yellow Dent.

Owing to being sown later in the season the crops of this variety were not so far advanced and therefore did not suffer so severely from floods as the earlier maturing varieties. Two small plots were washed out, but the balance did very well, and although some of them were completely covered with water for some days they soon recovered. Two plots in particular developed very well and yielded in the vicinity of 85 bushels per acre. The type and colour of the grain were very good, and it is considered that the seed of this variety was the best so far selected from the standpoint of quantity and evenness of type. Field characteristics, with the exception of the height of the ears, were very good. With regard to the latter there is still room for improvement. Ears on the whole were very large, and a considerable number of particularly good ears were secured for show purposes. The results from the ear-to-row test were very satisfactory, the highest yield recorded being 94.4 bushels per acre and the lowest 67.3 bushels per acre. The average yield for the sixteen rows was 81.57 bushels per acre.

Golden Beauty.

Only one plot was good enough for seed purposes, the others being too poor because of the heavy rains; only a limited quantity of seed was therefore available. This, as is usual with this variety, was very even in type and colour. Portion of the crop yielded very well, but the yield for the plot was only about 60 bushels per acre owing to a portion of the land being very rough at the time of planting and the crop made poor growth on this portion. The ear-to-row test plot was completely destroyed by inundation of the land on which it was sown.

Other Varieties.

Two small areas were sown with Flint varieties, and a quantity of seed was selected from one of these for further trial. The other plot was a failure owing to being sown too late in the season.

Northern Seed Maize Improvement Scheme.

This scheme was initiated last season at Burnside, Tolga, the variety used being Durum—a variety on which the Department has been working for some years with a view to producing a type of grain to suit the climatic conditions existing on the Atherton Tableland. A large area was sown, and the results so far are very pleasing. The crop was badly flattened by a cyclone when out in tassel, but made a very good recovery and developed a good yield. The husk covering and position and direction of the ears were splendid, the type of grain being very good.

"EAR TO ROW" TESTS—IMPROVED YELLOW DENT.

Row No.	Yield per Acre. Bushels.	Row No.	Yield per Acre. Bushels.
401 x 283	92.25	401 x 290	92.25
401 x 284	71.75	401 x 291	78.30
401 x 285	74.67	401 x 292	81.26
401 x 286	74.67	401 x 293	77.60
401 x 287	84.10	401 x 294	75.41
401 x 288	84.10	401 x 295	93.71
401 x 289	67.35	401 x 296	92.98
Check	70.28	401 x 297	94.44

Sown, 8-12-26; germinated, 13-12-26; tasselled, 10-2-27; ripened, 22-6-27; period of maturity, 191 days; highest yield, 94.44 bushels; lowest yield, 67.35 bushels; yield from check row, 70.28 bushels; average for plot, 81.57 bushels.

FUNK'S 90 DAY—1926-27 SEASON.

Row No.	Yield per Acre. Bushels.	Row No.	Yields per Acre. Bushels.
413 x 51	61.8	413 x 61	61.03
413 x 52	55.69	413 x 62	70.19
413 x 53	57.95	413 x 63	47.30
413 x 54	56.46	413 x 64	58.74
413 x 55	63.32	413 x 65	61.03
413 x 56	72.48	413 x 66	68.66
413 x 57	67.90	413 x 67	68.66
413 x 58	55.69	413 x 68	54.93
413 x 59	79.34	413 x 69	63.32
413 x 60	63.32	413 x 70	70.19
Check	57.98		

Sown, 6-10-26; germinated, 11-10-26; tasselled, 26-11-26; ripened, 31-1-27; period of maturity, 112 days; highest yield, 79.34 bushels; lowest yield, 47.30 bushels; yield from check row, 57.98 bushels; average for plot, 62.66 bushels.

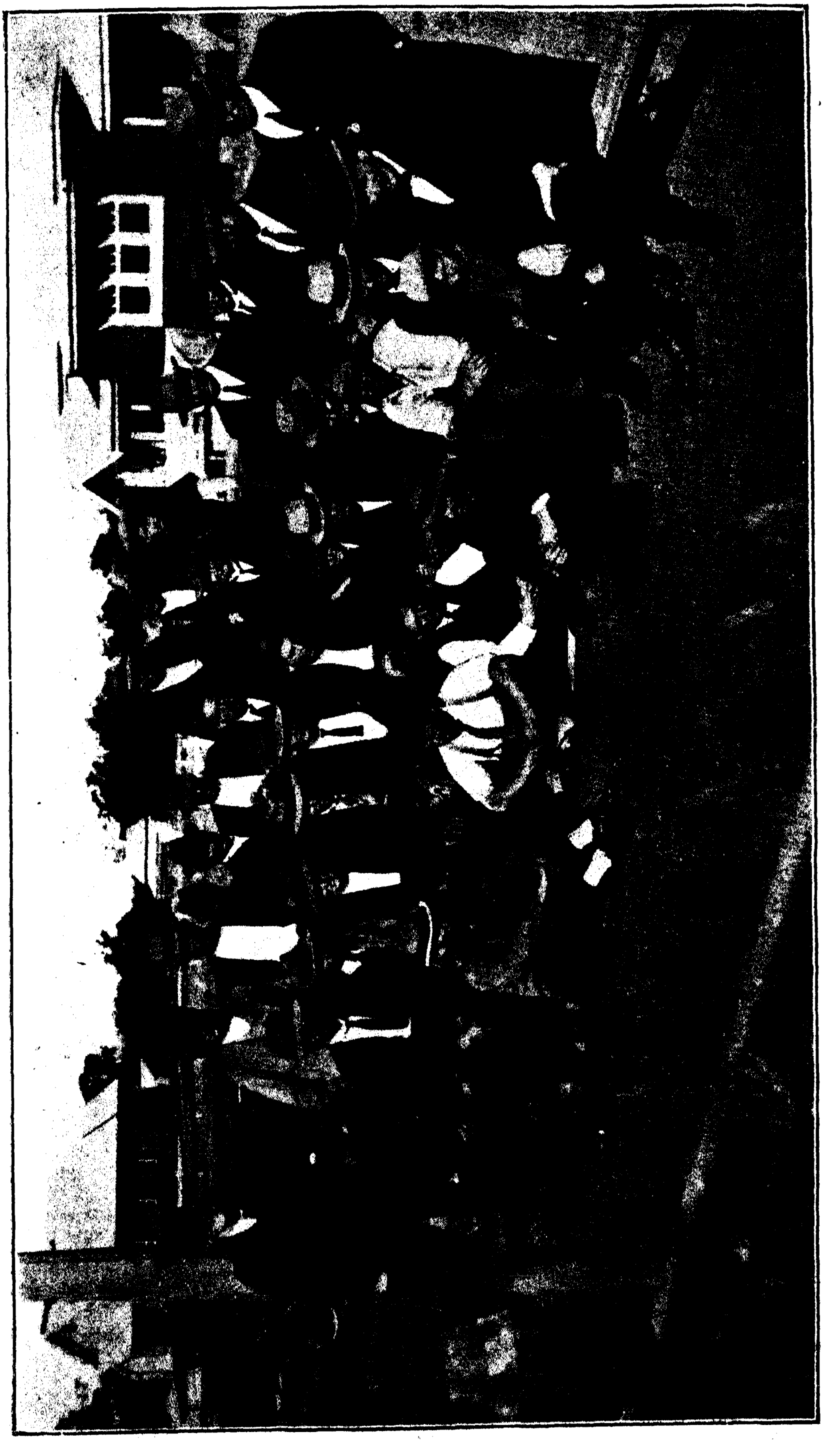


Plate 179.—Local Farmers and Others present at the McCormick-Deering Tractor School, held recently at Millmerran.

FARM TRACTORS.

By E. T. BROWN.*

The majority of tractors are fitted with two or three forward speeds and reverse. When ploughing on heavy land, it is advisable, as a general rule, to run the outfit on low gear, but when performing other land work, such as harrowing, discing, rolling, &c., the second gear can be used profitably. It is only when running on the road that the top gear is employed. Whenever starting away from rest, however, the low gear must be engaged first; a change is then made to second, and, finally, to top gear if required. To start from rest, the clutch must be disengaged and held in this position until the pinion wheels in the transmission gear have come to rest. Then the gear lever is pushed or drawn into the correct position for the intermeshing of the first speed pinions. The clutch is then allowed to engage slowly. Changing low to second or second to top must be done when the pinion wheels are in motion. Declutch, then bring the gear lever into neutral, pause a moment, then place into second or top position. Come down in the same way. Before reversing, the engine must be brought to a standstill.

Accelerating.

The speed of the tractor outfit is governed by the amount of combustible mixture supplied to the cylinders. This is regulated by a throttle. When starting away from rest, the throttle must be opened enough to enable the machine to get away, but so soon as a movement is made the throttle should be opened until the desired speed is attained. The practice of accelerating quickly, which is so common, is a bad one, especially when the ground is heavy or the load considerable. The throttle should always be opened slowly, since the sudden increase in the supply of the mixture is bound to put an additional strain on the engine and transmission. I do not mean to infer that any considerable length of time should elapse before the throttle is fully opened, but that all jerky movements should be avoided.

The Speed to Travel.

Taking the life of the tractor into consideration, the question of speed is a very important one. There is always a great tendency for a driver to try to get as much speed out of his engine as possible, especially when that engine is a powerful one. It is difficult to conceive of a greater mistake. There is nothing that damages a tractor more, eventually ruining it, than over-driving. When ploughing, it is quite sufficient to work at 1½ m.p.h. to 2½ m.p.h., according to the nature of the soil, depth of ploughing, and power of the outfit. To run at a speed greater than that intended by the designer means incalculable damage to the outfit. The added strain will show itself by rapid wear and tear of the working parts, even if it does not result in the direct breaking of some vital part of the machine.

Don't Stint the Oil.

It seems to be more or less customary among a great many farmers not to use oil until the squeak becomes penetrating. But this trait will have to be overcome if the tractor is to be maintained in good working order. True economy in tractor running lies in the constant use of oil on all working parts, not forgetting that the base of the engine requires attention as well. Purchase the best oil procurable, see that it is especially prepared for internal-combustion engines, and without wasting it, use it liberally. This will save pounds on depreciation in the course of a year.

The Oil Level in the Gear-Box.

The transmission gear in the majority of tractors is enclosed in a special case, and the gear wheels run in an oil bath. It is not necessary to inspect the gear-box frequently, but a point should be made of doing so, say, every three months. If it be noticed, however, that the oil is leaking out of the casing, it should be examined more often. To obtain the best results—that is, silent and easy running—the level of the oil should be sufficiently high to reach to the centre of the highest shaft in the box. Special gear oil should always be employed, but even this in very hot weather may be found to run rather on the thin side. It is a simple matter to thicken it, since all that is required is the addition of a little grease. Only a small quantity is needed.

---

* In the "Farmer and Settler."

AN INFORMATIVE JOURNAL.

Thus a Shannon Brook (Casino, N.S.W.) reader:—"The Journal is just great; every page contains valuable information for some one."

COMPARATIVE POTATO TRIALS IN THE NORTH.

During the past season comparative trials with sixty-one varieties of potatoes were undertaken on the coastal area, the sixty-one varieties being planted at Woodstock, forty-one varieties at Pentland, twenty-four varieties at Bowen, and fifteen varieties at Ayr.

Unfortunately, an unprecedently heavy frost at Pentland and at Woodstock, and an attack of late blight at Bowen, rendered these trials of no comparative value, seed only being obtained therefrom.

At Ayr, where fifteen varieties were grown on the farm of G. S. McKersie, an excellent season was experienced, the following yields being obtained calculated as for one acre:—

Variety.	Smalls.				Saleable.				Total.			
	T.	C.	Q.	Lb.	T.	C.	Q.	Lb.	T.	C.	Q.	Lb.
Up-to-Date	1	10	1	5	7	5	0	26	8	15	2	23
Cook's Favourite	0	17	3	14	7	12	0	0	8	9	3	14
Arran's Comrade	1	9	1	0	6	16	3	23	8	6	0	23
Clark's Main Crop	2	5	2	26	5	18	3	16	8	4	2	14
Tasma	0	19	2	23	6	16	2	24	7	16	0	19
Scottish Triumph	1	15	0	7	5	17	0	0	7	12	0	7
Carmen	1	15	0	20	5	16	2	26	7	11	3	8
Trafalgar Carmen	2	7	2	8	4	18	0	5	7	5	2	13
Gold Coin	0	11	3	4	5	15	0	26	6	7	0	2
Arran Chief	1	2	3	5	4	17	3	8	6	0	2	13
Dalhousie	0	14	1	17	5	0	3	9	5	15	0	26
Templar	0	17	3	21	4	16	0	23	5	14	0	16
White Albino	1	1	0	12	4	2	1	17	5	3	2	1
Lochar	1	4	2	21	3	17	0	18	5	1	3	12
Queen of the Valley	1	5	3	20	3	9	0	16	4	15	0	8

With the exception of Queen of the Valley, the tubers of all the varieties were well shaped, free from blemish, and proved of good cooking quality. Samples of each, together with a table showing the yields of each were exhibited in a shop window in Ayr, attracting a great measure of attention.

The seed of these varieties was originally secured at Brisbane in 1925, sown on the Tableland as a summer crop in 1926, seed from this sown on the coast the same year, seed being returned to the Tableland for the summer crop in 1927, from which the seed was secured for this crop.

Seed from the coastal crops is to be tried again on the Tableland this summer, the seed of the best yielding varieties being brought to the coast for trial next year.

So far the yielding capacity of the potato has not been seriously affected when the seed has been saved in the tropics.—N. A. R. POLLOCK, Northern Instructor in Agriculture.

THE JOURNAL APPRECIATED.

B.M., Wynnum, writes (7/11/27):—*"Your monthly Journal is very much appreciated; in fact, I put other reading matter aside until I have studied it."*

FERTILISER EXPERIMENTS WITH PEANUTS.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.*

In the course of the past few years peanut-growing has become an important industry in Queensland, and large areas, in the Kingaroy district mainly, are now being cultivated for the raising of this crop. With a view to obtaining data necessary to effectively carry on the industry, arrangements were respectively made with Messrs. B. Young, Memerambi, and J. Cavanagh, Wooroolin, for an area of land to carry out variety trials; also fertiliser and spacing tests. The soil is of red volcanic nature, the former plots being on forest, and the latter on scrub land. Both areas were typical of the class of country used for peanut-growing. Samples of soils were taken and submitted to the Agricultural Chemist.

Field Trials.

Experiments with fertilisers and the spacing tests were carried out with the variety Red Spanish; and the variety trials with Red Spanish, White Spanish, and Virginia Bunch.

Spacing Tests (*Two Plots*).—Each plot one-tenth of an acre. Distance between rows, viz.:—2 feet 4 inches, 2 feet 8 inches, 3 feet, with a single spacing between each plant of 12 inches.

Variety Trials (*One Plot*).—Each plot one-tenth of an acre Distance between rows, viz.:—2 feet 8 inches, with a single spacing between each plant of 12 inches.

A separate plot of Virginia Bunch was also sown, seed of which was obtained from E. Vesburg, Adelaide River, via Darwin, Northern Territory.

Fertiliser Tests (*One Plot*).—Each plot one-tenth of an acre. These plots were planted according to the local district standard, 2 feet 8 inches between the rows, with the plants spaced 12 inches apart. Ten plots, viz.:—

1. Unfertilised.
2. 200 lb. Nauru super mixture per acre.
3. 200 lb. Nauru super mixture per acre.
   80 lb. Muriate of Potash per acre.
   1,000 lb. Lime per acre.
4. 400 lb. Nauru super mixture per acre.
   160 lb. Muriate of Potash per acre.
   1,000 lb. Lime per acre.
5. 1,000 lb. Lime per acre.
6. Unfertilised.
7. 80 lb. of Muriate of Potash per acre.
8. 200 lb. of Nauru super mixture per acre.
   80 lb. of Muriate of Potash per acre.
9. 65 lb. of Nitrate of Soda per acre.
   200 lb. of Nauru super mixture per acre.
   80 lb. of Muriate of Potash per acre.
10. Unfertilised.

Previous to planting the lime was slacked and applied, followed by the broadcasting of the respective fertilisers allotted to each individual plot.

Planting.

The planting was carried out on the 27th November on Mr. B. Young's farm, and 28th and 29th December on Mr. J. Cavanagh's, with the ordinary two-row planter, and seed sown at the rate of 25 lb. per acre. The Virginian Bunch variety, which was low in germination and was sown at the rate of 35 lb. per acre, had to be planted by hand owing to the kernels being too large for the plates in the machine.

Germination throughout all plots was very fair, with the exception of the Virginia Bunch variety which was poor, and necessitated replanting in the missed spaces.

The plots generally made good growth, and compared very favourably with other crops in the immediate vicinity.

---

*In the Annual Report, Department of Agriculture and Stock, Q.

Harvesting and Threshing.

Harvesting of the plots was carried out on the 9th and 10th May. All plots at both centres did remarkably well, producing a good quality nut.

Threshing was carried out at Mr. B. Young's farm, and the following yields were obtained:—

FERTILISERS TESTS (RED SPANISH).

Plot No.	Yield per Acre. Cwt.	qr.	lb.
1	5	3	26
2	7	1	18
3	7	2	0
4	8	0	4
5	7	0	6
6	7	0	26
7	7	2	10
8	8	0	4
9	8	3	20
10	7	0	16

SPACING TESTS (RED SPANISH).

Plot No.	Distance between Rows.	Yield per Acre. Cwt.	qr.	lb.
1	2 ft. 4 in.	7	1	18
2	2 ft. 8 in	6	3	4
3	3 ft. 0 in.	5	1	2
4	2 ft. 4 in.	7	3	2
5	2 ft. 8 in.	7	0	26
6	3 ft. 0 in.	6	0	18

VARIETY TESTS.

Plot No. X.	Variety.			
1	Red Spanish	6	2	12
2	White Spanish	6	2	2
3	Virginia Bunch	8	1	16
Virginia Bunch (Darwin)		9	3	0

The plot of Mr. J. Cavanagh had not been threshed at the time of writing.

WHEAT IMPROVEMENT.

FIELD WORK OF THE DEPARTMENT.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.*

The wheat improvement work of the Department in relation to the breeding and evolving of new varieties to suit Queensland conditions is gradually exerting a beneficial effect; there is also a slight increase in the area cropped this season.

Growers generally have also kept themselves right up to date in the matter of modern labour-saving machinery, and a marked improvement has taken place in methods of cultivation and in varieties now cultivated.

Notwithstanding certain disabilities which farmers in different localities experienced in the course of the past season, there is every reason for optimism as to the future of wheat-growing in Queensland.

---

* In the Annual Report of the Department of Agriculture and Stock, Q.

It is pleasing to note that several varieties raised at Roma State Farm have again shown out prominently. A crossbred Cx B2d x Gluyas No. 2, now named "Duke of York," did remarkably well in the Cunningham district, when grown under similar condition, alongside of standard varieties.

This variety was first tried out in the Allora district three years ago, in single drills, and gave excellent promise in the way of resistance to rust, toughness of straw, power to hold grain, and high-yielding capacity; it should, therefore, become very popular. The following year this variety was tried out again on a small field area, and once more gave good promise. Last season, a propagation plot of 5 acres was planted, and yielded a good return of fair quality grain.

Wheat propagation plots and variety trials were carried out on the farms of Messrs. H. C. Murray, Southbrook; W. A. Lyell, Bony Mountain; E. Rowlings, Inglewood; and Geitz Brothers, Allora.

These trials represent a continuity of the work carried out each year. The system in vogue is the testing out of Roma crossbred wheats, under field conditions, the elimination of any undesirable varieties from the small plots, and extending suitable and proved varieties.

The results obtained from the variety trials and propagation plots were generally very satisfactory, and additional supplies of seed which complied with the Department's somewhat exacting requirements were secured.

Seed Wheat Improvement Scheme, 1926 Season.

In connection with the seed wheat improvement scheme which was introduced by the Department of Agriculture, and accepted by the State Wheat Board for the purpose of raising pure supplies of seed wheat (which include 60 per cent. of Departmental varieties), an active campaign has been initiated in association with the Wheat Board. An itinerary of the principal wheat-growing districts, with the view to locating reliable growers to undertake the raising of pure strains of seed was arranged.

Special attention was given, when choosing sites for these plots, to the selection of individual varieties to meet the varying conditions of soil and environment under which wheat is produced. Observations made over an extended period point to the necessity on the part of the grower of selecting a limited range of varieties to permit of development under normal seasonal growth; and additionally, to ensure that the kinds chosen should be suitable in every way for the situation and particular class of soil on the farm where the respective varieties are to be grown. Depreciated yields are too often met with through inattention to factors of this character, which have a very direct bearing on the State's production. In a number of localities in the course of the past two seasons more land was brought under the plough. On the Oakey-Mount Russell line attention is being paid to the heavy black soil of the plains, which are very extensive; here one of the Roma crossbred wheats, "Warrior," did very well when grown under similar conditions to other varieties, and it is satisfactory to note that several growers in the immediate locality secured seed from last year's plot, with the intention of planting it this season. Similar instances may be cited respecting other wheat-growing areas where the Departmental wheats have come into favour.

At Acland, on rich friable scrub soil, "Cedric" has proved very reliable, and has taken the place of other varieties. These instances could be added to, and are recorded as illustrations of the effective functioning of the wheat-improvement scheme.

In the course of the present season (1927) arrangements were made for twenty-nine plots, comprising 240 acres with eleven varieties, viz:—Bunge No. 1, Pilot, Florida, Flora, Watchman, Waterman, Warrior, Cedric, Beewar, Noro, Amby.

Departmental Wheat Propagation Plots, 1927.

Further arrangements have been made with Messrs. Geitz Brothers, Allora; W. A. Lyell, Bony Mountain; E. C. Stewart, Jandowae; and E. Rowlings, Inglewood; for the continuation of the variety trials during the coming season. At each centre 150 Roma crossbred wheats and a few standard varieties, also several varieties of barley were planted. Sowing was carried out as follows:—Jandowae and Allora, 8th and 9th June; Bony Mountain, 10th June; Inglewood, 13th June.

Good rain was experienced on the 3rd and 4th June at all centres, ranging from 70 points to 210 points. Satisfactory germination was assured. Further rain again fell on the 17th June, which gave the young plants an excellent start.

In addition to these trials, an extension of the wheat propagation plots was arranged for the purpose of increasing the area under the new "Duke of York" variety. Plots were established in the following districts:—

Name of Grower.	Area.	Date Sown.
	Acres.	1927.
Noller Bros., Oakey	5	10th June
E. Rowlings, Inglewood	10	25th May
W. A. Lyell, Bony Mountain	11	11th June
E. C. Stewart, Jandowae	6	10th June
J. and F. Noller, Kumbia	5	24th June

PASPALUM PASTURE RENOVATION.

PROGRESSIVE REPORT ON EXPERIMENTS.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.*

The two plots which have been established at Maleny and Cooroy go to prove that the ploughing-up of the old root-bound paspalum pastures is undoubtedly the quickest way of giving them new life.

This was very noticeable when cuttings were made, by the quantity and quality of grass harvested. In addition to the enclosed squares established in the centre of each plot, control areas B and C were marked out, and cuttings were made at the same time as the enclosed squares for comparison purposes. Cutting commenced on the 11th November, 1926, and continued each month until April, 1927.

Following are the rainfall figures for both localities:—

Month.	COOROY.		MALENY.	
	Wet Days.	Points.	Wet Days.	Points.
1926.				
July	6	83	2	133
August	3	16	..	..
September	30	774	8	584
October	3	152	2	108
November	3	162	1	38
December	18	2,033	15	2,631
1927.				
January	22	2,839	17	3,877
February	12	553	6	390
March	23	1794	22	2,239
April	8	504	8	785
May	1	10	1	12
June	7	297	5	364
Totals	136	9,226	87	11,161

---

* In the Annual Report of the Department of Agriculture and Stock, Q.

The following list gives details of the individual and aggregate weights of green grass cut from each individual plot:—

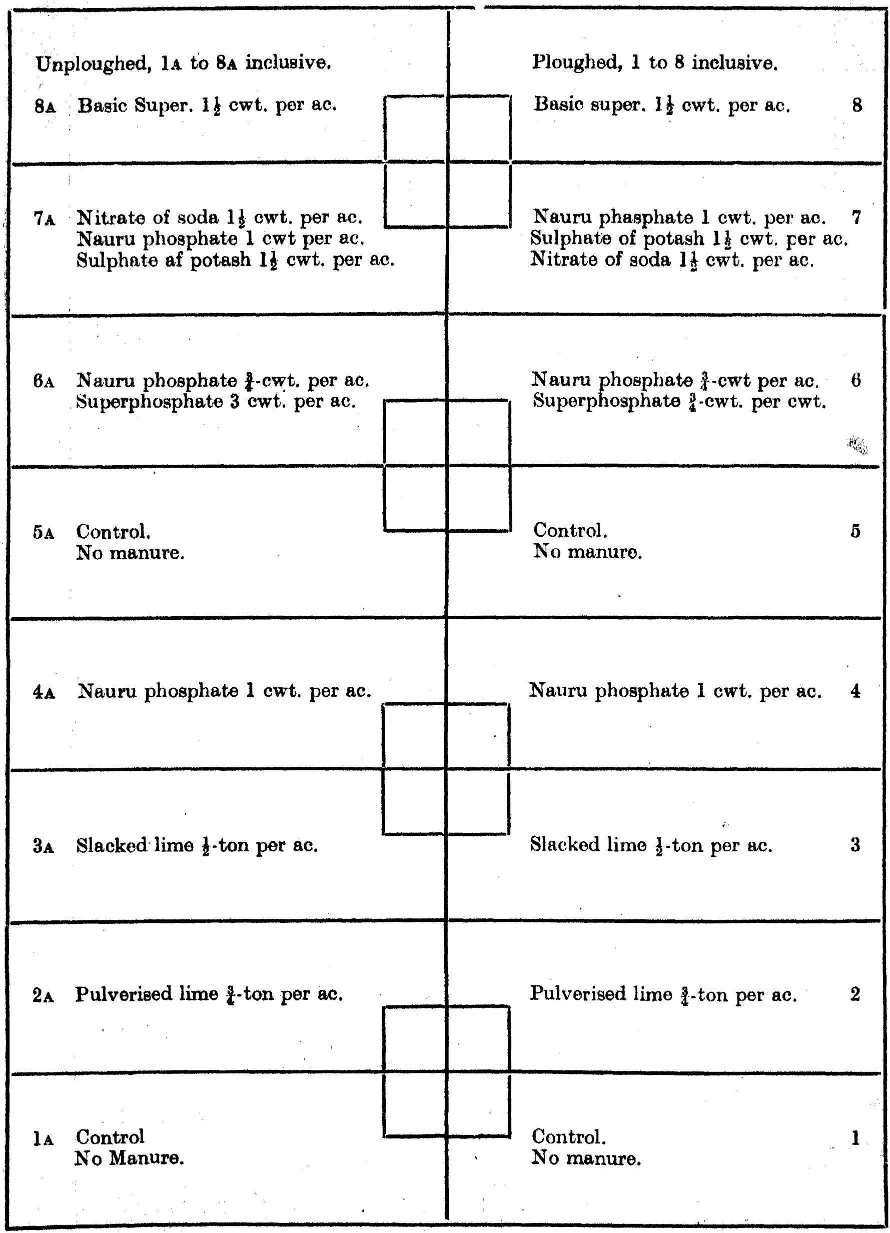
Cooroy.

Plot No. Ploughed Area.	Plot No. Un-ploughed Area.	**1924–1925.** Date of Cuttings—	**1925–1926.** Date of Cuttings— 19-11-25, 21-12-25, 18-1-26, 17-2-26, 23-3-26, 22-4-26, 25-5-26.		**1926–1927.** Date of Cuttings— 9-11-26, 9-12-26, 12-1-27, 10-2-27, 17-3-27, 29-4-27.		CONTROL AREAS.		**1926–1927.** Date of Cuttings— 9-12-26, 12-1-27, 10-2-27.	
			Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Plot No. Ploughed.	Plot No. Un-ploughed.	Aggregate Weight per Cutting per Acre.	Total Weight of Grass.
			Tons.	Tons.	Tons.	Tons.			Tons.	Tons.
..	1	No cutting was made during the season	·929	6·502	·91	5·49	1B	..	3·46	1·15
1A	..		·62	4·33	·87	5·23	..	1C	3·25	1·08
..	2		·745	5·21	1·33	7·99	2B	..	3·35	1·12
2A	..		·73	5·11	·97	5·83	..	2C	2·62	·87
..	3		·95	6·68	1·27	7·66	3B	..	5·20	1·37
3A	..		1·17	8·21	1·22	7·31	..	3C	4·19	1·39
..	4		·92	6·49	1·01	6·07	4B	..	2·45	·82
4A	..		·69	·69	1·28	7·70	..	4C	2·39	·79
..	5		1·54	10·78	1·20	7·21	5B	..	2·62	·87
5A	..		1·19	8·35	1·97	10·74	..	5C	2·81	·93
..	6		1·90	13·33	1·65	9·89	6B	..	3·87	1·29
6A	..		1·55	10·82	2·25	13·48	..	6C	4·55	1·52
..	7		1·54	10·78	1·05	6·33	7B	..	3·80	1·27
7A	..		·91	6·36	1·55	9·30	..	7C	3·31	1·10
..	8		1·25	8·75	·68	4·08	8B	..	4·05	1·35
8A	..		·69	4·86	1·40	8·42	..	8C	2·86	·95

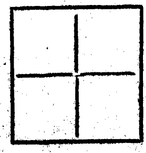
Maleny.

Plot No. Ploughed Area.	Plot No. Un-ploughed Area.	1924–1925. Date of Cuttings— 25-2-25, 15-6-25.		1925–1926. Date of Cuttings— 20-10-25, 23-11-25, 17-12-25, 18-1-26, 18-2-26, 23-3-26, 22-4-26.		1926–1927. Date of Cuttings— 12-11-26, 10-12-26, 13-1-27, 11-2-27, 16-3-27, 27-4-27.		CONTROL AREAS.		1927. Date of Cuttings— 13-1-27, 11-2-27, 27-4-27.	
		Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Plot No. Ploughed.	Plot No. Un-ploughed.	Aggregate Weight per Cutting per Acre.	Total Weight of Grass.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.			Tons.	Tons.
1	..	2·13	4·26	1·65	11·57	1·74	10·44	1B	..	1·28	3·85
..	1A	1·40	2·81	·65	4·58	1·23	7·38	..	1C	·83	2·50
2	..	2·23	4·47	2·03	14·19	2·04	12·27	2B	..	1·32	3·96
..	2A	1·91	3·82	·51	4·19	1·30	7·81	..	2C	1·16	3·47
3	..	3·11	Only one cutting was made. Second cutting not recorded owing to damage by stock	1·79	12·42	1·32	7·59	3B	..	1·11	3·32
..	3A	3·87		·81	5·70	·92	5·50	..	3C	·95	2·86
4	..	2·48		1·84	12·91	1·12	6·76	4B	..	1·74	5·23
..	4A	3·14		·99	6·99	·78	4·67	..	4C	1·49	4·46
5	..	2·62	5·25	1·81	12·65	1·56	9·35	5B	..	1·24	3·71
..	5A	2·60	5·21	·96	6·72	1·07	6·43	..	5C	1·20	3·61
6	..	2·73	5·47	2·29	16·00	2·04	12·27	6B	..	1·64	4·92
..	6A	3·50	7·00	1·35	9·42	1·28	7·70	..	6C	1·52	4·55
7	..	3·04	6·09	1·89	13·20	1·66	9·94	7B	..	1·81	5·44
..	7A	2·90	5·81	·80	5·59	·73	4·41	..	7C	1·46	4·39
8	..	4·24	8·48	2·09	14·61	1·76	10·57	8B	..	2·49	7·48
..	8A	2·36	4·73	·72	5·08	1·37	8·25	..	8C	2·02	6·07
7BB	..	..	..	2·27	15·93	2·73	10·92	..	..	..	..
8BB	..	..	..	2·33	16·31	2·31	9·25	..	..	..	..

SKECTCH PLAN AND DETAILS OF MALENY PLOTS.—AREA, 2 ACRES.



Unploughed, 1A to 8A inclusive.		Ploughed, 1 to 8 inclusive.	
8A	Basic Super. 1½ cwt. per ac.	Basic super. 1½ cwt. per ac.	8
7A	Nitrate of soda 1½ cwt. per ac. Nauru phosphate 1 cwt per ac. Sulphate af potash 1½ cwt. per ac.	Nauru phasphate 1 cwt. per ac. Sulphate of potash 1½ cwt. per ac. Nitrate of soda 1½ cwt. per ac.	7
6A	Nauru phosphate ¾-cwt. per ac. Superphosphate 3 cwt. per ac.	Nauru phosphate ¾-cwt per ac. Superphosphate ¾-cwt. per cwt.	6
5A	Control. No manure.	Control. No manure.	5
4A	Nauru phosphate 1 cwt. per ac.	Nauru phosphate 1 cwt. per ac.	4
3A	Slacked lime ½-ton per ac.	Slacked lime ½-ton per ac.	3
2A	Pulverised lime ¾-ton per ac.	Pulverised lime ¾-ton per ac.	2
1A	Control No Manure.	Control. No manure.	1



Intersections of plots enclosed with wire-netting-covered stock-proof hurdles.

Answers to Correspondents.

Sensitive Plant.

INQUIRER (Aitape, New Guinea)—

Mr. H. T. Easterby, the Director of the Bureau of Sugar Experiment Stations, advises that arsenical sprays have been used with some measure of success on the Sensitive Plant in Queensland. As, however, this plant makes an excellent green manure for sugar-cane, it is very often ploughed under. In some analyses that were carried out at the Mackay Sugar Experiment Station it was found to contain 276.86 lb. of nitrogen per acre in a 15-ton crop, which was equivalent to a dressing of 1,384 lb. of sulphate of ammonia. It also contains large quantities of lime potash and phosphoric acid.

The Use of Sulphate of Iron.

H.F.S. (Dalveen)—The Senior Analyst advises as follows with reference to your inquiry regarding the use of sulphate of iron:—

Sulphate of iron, upon decomposing, liberates sulphuric acid, which produces scorching; for this reason lime is usually used at the same time when spraying with ferrous sulphate. I have no record of spraying apple-trees with ferrous sulphate alone, but one European authority states that young vine leaves must not be sprayed with strong solution of this substance. Therefore in this hotter climate it certainly would be safer to experiment with a weak solution, and it is suggested that you try spraying (not heavily) one tree or portion of one tree with a solution of iron sulphate in the proportion of 1 lb. sulphate to 40 gallons of water and note the effect whether harmful or otherwise.

Weeds on Lawn and Garden Paths.

J.S.C. (Brisbane)—The Senior Analyst advises:—

(*a*) *Clover on Lawn.*—The best means of eradicating clover without appreciably damaging the lawn grass. *Reply:* Sulphate of Ammonia is effective, besides acting as a tonic to the grass.

(*b*) *Weeds in Garden Paths.*—The best means of extirpating weeds on a gently sloping garden path with a brick border on either side. A bouganvillea hedge flanks the pathway. *Reply:* Strong brine solution made with common butcher's salt. It is safer than arsenic.

(*c*) *Nut Grass in Garden Paths.*—Is it possible to check appreciably this growth by the application of the specific recommended for (*b*)? *Reply:* Yes, but not permanently.

BOTANY.

The following replies have been selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

Native Quinine.

T.A.P. (Toowoomba)—

Your specimen of small tree from the Warwick district is a native Quinine or Bitter Bark, *Alstonia constricta.* The bark contains the alkaloids alstonine, alstonidine, porphyrine, and porphyrosine. The bark is (or was) included in the Pharmacopœia.

Erythraea australis—Monstera deliciosa.

T.H.B. (Kinleymore, via Murgon)—

The plant you enclose is *Erythræa australis.* A decoction made from it is sometimes used as a tonic. The fruit you mention is *Monstera deliciosa* (Mon-stera de-lici-osa).

Nut Grass.

W.B. (Yarraman)—

The specimen is the common Nut Grass, *Cyperus rotundus.* It is a very serious pest in cultivation, and if there are only a few plants in your ploughed paddocks it would be advisable to dig them out and destroy them.

The following reply has been selected from the outgoing mail of the Assistant Botanist, Mr. W. D. Francis:—

"Red Head" or "Red Cotton Bush."

A.J.G. (Inkerman, N.Q.)—

Your specimen is known as Redhead or Red Cotton Bush, *Asclepias curassavica.* It is reputed to be poisonous to stock, and may be the cause of the death of your cattle. In many cases we have noticed that cattle in ordinary seasons avoid this plant. If you find that your cattle are eating the plant to any extent it would be advisable for you to cut it down or dig it out if practicable.

PIG RAISING.

Replies selected from the outward correspondence of the Instructor in Pig Raising, Mr. E. J. Shelton:—

Paralysis in Pigs.

W.B. (Mapleton)—

Tick ("bush" tick) paralysis in pigs is not uncommon. The first thing to do is to cut the ticks away with a sharp razor. Do not attempt to pull or tear the tick out, for, by so doing, you may force more of the poison into the pig's body. Follow the advice contained in the leaflets forwarded. It is not usual for cattle ticks to infest pigs, but the common bush tick will fasten itself on to pigs in much the same way as it does on to dogs, and results are much the same. Some of the Pig Club children have noticed that bush ticks are more plentiful in paddocks where blady grass and similar growths exist. Blady grass, as you are aware, is of little or no value as stock feed, hence no loss would be incurred in burning off patches of this grass.

Sick Pigs.

H.W.H. (Nikenbah)—

It is evident that the sow died from pneumonia. The fact that she suffered from severe spasms of pain and had great difficulty in breathing, indicates clearly that her lungs were badly affected. Your references to the post-mortem examination also confirms the above statements, and we agree it was evident the trouble was not due to improper foods.

If the boar is still sick we advise a good course of opening (purgative) medicine. Give a good bran mash fed warm as the first feed of the day after he has been without food for twelve hours or more. Add just sufficient salt to this mash to give it a very slight flavour and give at about the consistency of thick cream. To the mash prepared as per details given in pamphlet on "Administration of Medicines to Pigs" (page 276), add 4 fluid ounces of castor oil. Repeat this the following day if his bowels have not been relieved, and compel him to take regular exercise even if it means driving him about for a while each day.

Fresh green food such as green lucerne, clover, succulent grasses, &c., might tempt his appetite, while he should have an abundant supply of drinking water. It is useless attempting treatment unless this is followed by a general improvement in the conditions under which the pigs are kept. One would be inclined to think your pig sty accommodation is at fault.

Making Pigs Pay.

T.B. (Finch Hatton, Mackay)—

1. You are correct. In order to make pigs a payable proposition, it is necessary to utilise such farm-grown foods as is possible, for there is little or no profit in the business if the food has to be purchased from outside sources; although it is agreed that there are times when it pays to purchase a certain quantity of concentrates which cannot be produced profitably on the farm.
2. As to the yield of pumpkins per acre, it is difficult to state definitely the weight per acre that might be expected from any given area. A really good crop might produce from 20 to 30 tons per acre, while if conditions are generally unfavourable, the return might be very small.
3. It is not a commercial proposition to store pumpkins in underground pits, the same way as turnips, &c., are pitted in other countries, for they will not keep for any great length of time in that condition. Storing them in a

clean, dry barn in which there is a fairly good draught of cool air, giving them plenty of room, and regularly inspecting them and picking out any that are decaying, appears to be the only way in which they can be successfully stored. Even then, careful handling is very necessary.

4. No definite experiments have been carried out in Australia, as far as we are aware, on feeding pigs entirely on ensilage made from the crops to which you refer. Ensilage may, however, be fed satisfactorily to bacon pigs, breeding stock and so on, in just the same way as lucerne hay may be fed. Under ordinary farm conditions, it would not pay to go to the expense of preparing ensilage especially for the pigs, for the reason that they much prefer fresh, succulent green foods and root crops. It certainly pays to feed ensilage if the crop is being prepared for other stock as well as for the pigs. It also pays to store lucerne hay, particularly for the breeding sows. It also pays to grow as many crops as it is possible to grow and to store grain for use during winter time and during other periods when milk and similar foods are in short supply. Fish meal is not available on the markets of Australia, for the reason that there has been no call for this particular meal here. We are, of course, aware that it is used extensively in England and in many other countries overseas. Several brands of meat meal, protein meal, &c., are, however, available, and we send you particulars of some of these. The firms manufacturing these products advertise extensively. You will find several advertisements in the "Queensland Agricultural Journal" that are well worth your study.
5. Price per pound live and dressed weight which one might expect for the pigs when they are ready for the butcher or bacon factory—we are forwarding current price lists, from which you will note that the general average on a dressed weight basis at the present time is about 7d. to 7½d. per lb., with 8d. per lb. as the top price for prime quality pigs of correct weight. These matters have all been dealt with in this Journal, extracts from which have been posted. It is our aim to render all the assistance possible to those who are interested in the industry.

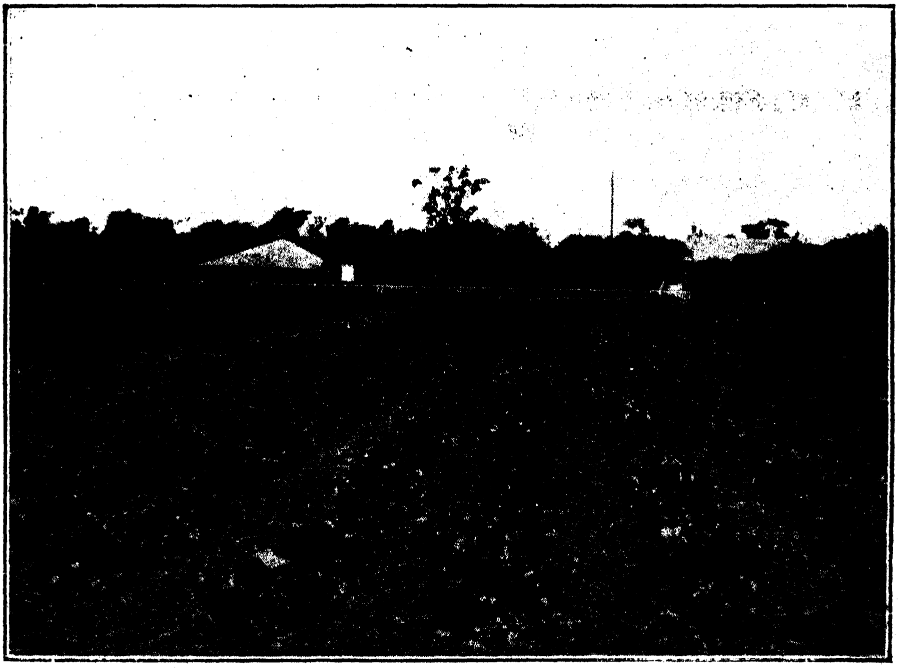


PLATE 180.—STRAWBERRY AND TOMATO EXPERIMENTAL PLOTS ON MR. F. W. WORT'S FARM, RABY BAY, CLEVELAND.

Both plots were top-dressed with Nitrate of Soda before the first of the Spring rains.

General Notes.

Staff Changes and Appointments.

The Officer in Charge of Police at Richmond has been appointed Acting Inspector of Stock, as from 1st November, 1927.

The Armistice Anniversary.

The ninth anniversary of the signing of the Armistice was commemorated appropriately throughout the State on 11th November. In the capital a great concourse assembled in front of the Post Office, where occasional addresses were delivered. His Excellency the Governor (Sir John Goodwin), in addressing the gathering, said the fact that they were present on the occasion was due to the self-sacrifice and heroism of those men whose memory they were honouring. The bodies of those men lay all over the world, but their memories remained for all time. ''It is an honour for us to meet on this day of the year,'' added His Excellency, ''in order to pay a short tribute of reverence and respect to the memories of those gallant men who gave everything they had, and to whom we owe all that we possess—our lives, our prosperity, our country, and our Empire. That is the debt we owe them, and we respect and reverence their memory.''

The Acting Premier (Mr. W. Forgan Smith) said he felt it an honour to represent the Government on such an occasion. It was an occasion on which they indulged in some introspection. It was a time when they paid their grateful tribute to those who did so much for the Empire to which they all belonged. They were celebrating the Armistice—the dawn of peace after the greatest war that the civilisation of the world had ever known. It was their duty to hold in grateful remembrance all those men and women who took part in it, and those who sacrificed everything. ''It is our duty also,'' he added, ''to consider whether we are worthy of what has been done. The great principles of heroism, service, and sacrifice which constituted the spirit of Anzac are required to deal with the problems of peace. It is our duty to see to it, as citizens of this great Commonwealth, that everything is done that is humanly possible to perpetuate those principles in the life of the community. The problems of peace are always wth us, but if we meet them with that spirit of service and self-reliance and courage that was manifested by the men and women who took part in the Great War, then we can say that their sacrifice was worth while, and that posterity will enjoy the benefit of it.''

Marketing Tomatoes.

A Regulation has been issued under the Fruit Marketing Organisation Acts to provide for the poll that is to be conducted upon the question of the proposed issue of a Direction that all tomatoes offered for sale or sold at Brisbane or Rockhampton on a wholesale basis (that is, in any other way than from a retailer or grower to a consumer), shall be done only by the Committee of Direction, its agents and servants, and by such other agents as shall observe the conditions set out by the Committee. These conditions provide that any grower of tomatoes may consign his tomatoes to any agent of his own choice for sale by such agent on the growers' behalf. The agent, however, shall, when instructed by the Committee, request growers not to send him consignments of C or B grade tomatoes, but which grades (C or B) if sent to any agent, notwithstanding instructions to the contrary, may be disposed of by the Committee to canners if found in suitable condition; but if not in suitable condition for canners' requirements will be disposed of at growers' expense. In the event of a grower sending C or B grades to an agent the latter to advise the Committee of Direction of Fruit Marketing.

This Direction is to remain in force for twelve months as from the 19th October, 1927.

The ballot-paper to give the growers concerned an opportunity of voting on the matter will be issued by the Committee of Direction, and must be returned to that organisation by not later than noon on the 15th December. Persons who have the right to vote are all growers who, during the twelve months prior to 20th October, 1927, had under cultivation at any one period an acre of tomatoes containing not less than 1,200 plants, and who had consigned tomatoes for sale on a wholesale basis to either the Brisbane or Rockhampton market during those twelve months, and whose intention it is to grow not less than one acre of tomatoes at any period during the ensuing twelve months, and who intend to consign tomatoes for sale on a wholesale basis to either Rockhampton or Brisbane markets during that period.

Canary Seed Board.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) advises that the following nominations have been received for election as Growers' Representatives on the proposed Canary Seed Board:—Thomas Perse Grimes, Clifton; Thomas Muir, Allora; and Michael Coleman, Nobby. Two members will be required.

Obituary.

The announcement of the death of Jessie Mary, the only daughter and youngest child of the Deputy Premier and Minister for Agriculture, the Hon. W. Forgan Smith, and Mrs. Forgan Smith, on 1st December, was received amid general expressions of profound regret. The little sufferer succumbed only after a brave struggle to live, and, in an effort to save her life, two transfusions of blood from her father were effected. It became sadly evident, however, that not even the father's sacrifice would avail. Little Miss Jessie was an exceptionally bright and winsome child, and the sympathy of the whole community goes out to the bereaved parents in their time of trial and overwhelming sorrow.

The Quality of Queensland Bananas—Activities of "Geographical Protectionists."

When the Minister for Agriculture (Mr. W. Forgan Smith) was explaining in the House, a few days ago, the details of the Primary Produce Experiment Stations Bill, he mentioned that the banana industry is worth a little over £1,000,000 a year to the people of Australia. It is a white man's industry, and is capable of great expansion. Unqestionably Queensland can produce all the bananas that can be consumed in the Commonwealth by many times the present population. It is interesting, therefore, to note that the geographichal protectionists of Melbourne are strenuously endeavouring to revive the Fiji banana industry. We are told that negotiations have been opened up with the Fiji Government; that the natives are to be encouraged to plant on a large scale; and that special steamers are to be purchased for the carriage of the fruit. To a very large extent the growers in Queensland are responsible for this effort to revive their most dangerous competitor. Mr. Forgan Smith admitted in his speech in the House that inferior bananas had been sent to the Southern markets, and he laid down the sound principal that when a Government gives protection to an industry it is the moral responsibility of those engaged in that industry to provide both quantity and quality of the product as required. Under the new Bill, when it becomes law, the Government will be able to prevent careless and indifferent growers from damaging a market that has been built up with great difficulty, and it is to be hoped it will exercise that power. If we are to retain the duty we must supply the quality of the banana that the Southern markets demand.—A "Brisbane Courier" editorial.

Scientists Needed.

When discussing in the Legislative Assembly the growth of the banana industry, Mr. Frank Bulcock, the representative for Barcoo, paid a well-deserved tribute to the work of the agricultural scientists, claiming that the success of agriculture in the Commonwealth had been due to their assistance. This is an exceedingly important fact, and one too frequently overlooked; it is satisfactory, therefore, to find a member of the Ministerial party, and especially the representative of a pastoral constituency, taking the long national view regarding agriculture, and telling the House that the scientists are deserving of greater recognition. Now that a Chair of Agriculture has been established at the University, under the control of Professor Goddard, who has done so much to bring the results of the researches of the University into the homes of the farmers, we hope that Queensland will be able to train its own plant pathologists at no distant date, and all the other experts whose services will become increasingly important within a few years. In a State like Queensland, where the costs of production are much higher than in most of the other producing countries of the world, it is necessary that every opportunity shall be given to the producers to enable them to keep down the costs and to eliminate unnecessary waste. However much we may hope from the development of our secondary industries, we must keep the national perspective, and realise that Queensland is, essentially and fundamentally, a country of primary production. It is on that that our future prosperity rests.—From a "Brisbane Courier" editorial.

Northern Pig Board.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) advises that the following nominations have been received for election as members of the Northern Pig Board:—Robert Thomas Croker, Malanda; David Johnston, Malanda; Frederick Henry Hyde, Peeramon; Robert Campbell, Peeramon; and Hugh Quinn, Peeramon. As five members are only required, no election will be necessary.

The Dutch Egg Industry.

Down to the year 1907 Holland was an egg-importing country, but since then she has entered the ranks of the exporters to England and Germany, and the quality of her eggs has steadily improved year by year. The bulk of the eggs are sold to private dealers at the weekly markets, and one bad consequence of this is that eggs are to some extent held back at certain seasons of the year.

The big egg market at Barneveld, about 10 miles from the town of Amersfoort, is particularly interesting, being in the centre of one of the best egg-producing districts. The number of eggs marketed weekly is often about 3,000,000 at the Roormond market, 2,000,000 at Arnhem, between 25,000 and 500,000 at Barneveld (according to the season), and from 20,000 to 400,000 to Amersfoort. The eggs are candled, sorted, and packed at once; the brown eggs are all sent to England, and the white eggs to Germany. Eggs destined for England are despatched, if possible, on the same day to Rotterdam, and shipped that evening viâ Harwich to London; other consignments go to Hull and Leith.

Much of the credit for the progress made is due to the Dutch Poultry Organisation Society (locally known as the "V.P.N."), which has some 58,000 members, and a branch in every province, embracing some hundreds of local societies. Payment of the subscription entitles members to send eggs and poultry both to the local egg society and to the big egg markets, where 25 per cent. of the entire production is sold. Members stamp their own numbers and that of their society upon the eggs; fines are imposed upon members who send in inferior eggs. The candling apparatus used enables from 5,000 to 6,000 eggs to be tested every hour.

Experimental Consignment of Australian Oranges.

Interest attaches to an experiment made with a cargo of 235 cases of South Australian oranges shipped to Great Britain by the "Bendigo." Excluding six cases in various wrappers, which were sent for special investigation by Dr. Barker, of Cambridge University, half of the cargo was carried in cold chambers, and the balance under ordinary cargo conditions between decks, without even a through draft. In appearance and condition there was no difference between the two lots, but on being tasted, those carried in cold store showed a fuller and finer flavour. The wastage was 1½ per cent. on large fruit, and none on the smaller fruit. The results are considered excellent, and were unexpected, says the "Imperial Food Journal."

The Royal Society of Queensland—Abstract of Proceedings.

The ordinary monthly meeting was held in the Geology Lecture Theatre at the Queensland University on Monday, 31st October, 1927.

The President, Professor E. J. Goddard, was in the chair.

Dr. L. Bagster exhibited two blocks of slag showing large crystals, which were probably a silicate of calcium and iron. The specimens had been presented to the Geology Department by Mr. Boyd, of Mount Morgan. Comments were made by Messrs. F. Bennett and H. Tryon.

Dr. J. V. Duhig demonstrated the hæmolytic action of the venom of the dorsal spines of the common Stone Fish (*Synanceja horrida*), as a preliminary to a paper to be published later on the venom of this species. He showed three tubes—(1) washed guinea-pig red cells + *Synanceja* venom, sedimented, showing a marked zone of hæmolysis; (2) the same as the first, but shaken to show the hæmoglobin in solution; (3) red cells + saline solution showing no hæmolysis. Dr. Duhig also briefly explained the neurotropic action of *Synanceja* venom, and demonstrated the poison sacs *in situ* on a dissected dorsal fin spine. The exhibit was commented on by Mr. F. Bennett and the President.

Mr. E. W. Bick exhibited an egg laid by a cassowary in captivity in the Botanic Gardens. This bird, when first brought to the gardens, had been considered an exceptionally fine specimen of a male by competent ornithologists. The President, in commenting on the exhibit, spoke of the relative frequency of occurrence of sex reversal in birds, and suggested the possibility in this instance. Dr. Duhig said that he had a hen at his home which had developed male characteristics.

Mr. W. D. Francis read a paper entitled, "The Rain-forest Flora of the Eungella Range." The rain-forest flora of the Eungella Range contains constituents of both the Southern and Northern rain-forests of the State. Its species constitution has evidently been influenced by the intermediate position of the area, the heavy rainfall (65 inches), and the elevation. The area contains some species which are identical with or allied to species abounding in mountain areas of Northern New South Wales, Southern and Northern Queensland, Papua, and Malaya. The paper was commented on by Messrs. Bennett, Bick, Tryon, Simmonds, Herbert, and the President.

Mr. D. A. Herbert read a paper on "Nutritional Exchange between Lianas and Trees." Small oval pieces of wood attached to rain-forest trees were found to be fused to the trunks. It was shown that these were the remains of woody vines which had rotted, leaving only small residual pieces of wood. It was contended that this was the result of the rotting away of other parts of the vine, the fungus not attacking the woody button so readily because of the presence of substances derived from the stem with which fusion had taken place. Specimens were exhibited showing stages in the formation of the buttons, one being noteworthy in showing the fusion of a dicotyledonous vine with a palm (*Archontophœnix Alexandræ*). The paper was commented on by Messrs. Tryon and Bennett.

Central Cane Prices Board.

Following on the recent election, the Central Sugar Cane Prices Board has now been constituted for three years as from 13th November, 1927, as follows:—His Honour Mr. Justice W. F. Webb, Chairman; Messrs. T. A. Powell, Canegrowers' Representative; J. Smith, Millowners' Representative; J. M. MacGibbon, Qualified Sugar Chemist; and A. R. Henry, a person experienced in accountancy and audit. The only new member to the Board is Mr. John Smith, who succeeds Mr. B. R. Riley as Millowners' Representative. Mr. Smith, however, has had previous experience as a member of the Board.

Tropical Fruits.

In the course of the debate on the second reading of the Primary Produce Experiment Stations Bill in the Legislative Assembly, the member for Bowen (Mr. C. Collins) complained of the lack of knowledge displayed by most persons with respect to the nutritive value of tropical fruits. One of the splendid fruits that his district was capable of producing in large numbers was the egg fruit, which was very appetising and nutritive if cooked properly. Another fruit which was grown in the North in large numbers was the granadilla, but this also was seldom seen in Brisbane. One of the things the experiment stations would have to do was not only teach the people how to grow fruit profitably, but how to acquire a taste for the locally-grown fruit. Even then it might be necessary, eventually, also to teach consumers how to cook the fruit to the best advantage, so that the dish would be appetising.

The Celotex Industry—Its Potential Importance to Queensland.

It is the opinion of Mr. M. P. Campbell (who was a member of the Australian Industrial Delegation to the United States this year) that the use of celotex in home building will have a material effect on the comfort of homes in the tropical parts of Australia, making them more comfortable, endurable, and cool. Mr. Campbell, who is president of the Queensland Chamber of Manufactures, recently gave the Press an account of what he had seen as a visitor to the celotex factories in the United States. He said he thought the greater use of the product would help to settle the North of Queensland. In Chicago some members of the delegation spent half a day at the celotex laboratory, which was conducted entirely for research and experimental work in connection with the industry. They saw the product treated in thousands of different ways, in order to obtain varying effects. It was made to look like stone, cement, and rough cast, and some of the walls in the laboratory were covered with pictures, which had been painted directly on the celotex. Artists were permanently engaged in this class of work, and many beautiful designs and effects were secured. The laboratory also employed several physicists and research chemists, who were working ahead of requirements and looking towards the future of the industry. After leaving Chicago they discovered that celotex was used largely in every other city of America. They visited theatres, churches, offices, schools, and hospitals, and found they were fitted with acousti-celotex, which had the property of absorbing sound. The Celotex company's engineers undertook to compute how much of this material was required to correct the acoustics of any room or place. Many new offices were installing it to deaden the sound of typewriters, and it was found to be of great advantage, especially in schools and hospitals. At New Orleans they saw the celotex plant which made a lasting impression on the delegates on account of the way in which the machines were using up a hitherto almost useless waste product and converting it before their eyes into such useful material. The plant could best be described as a huge paper mill. The megas went in at one end, and was converted into pulp, squeezed, rolled, dried, and cut into sheets in a few minutes.

The finished product came out of the rolls at a comparatively fast rate, and was cut by ingenious devices, and then packed and placed aboard the railway trucks for despatch. It was remarkable that although 1,250,000 feet were turned out daily there was no accumulation of stocks, the demand being so great that the celotex was sent direct from the cutting table. The manufacture of celotex was contemplated in Queensland. In addition to converting a practically waste product into profitable material, it would divert the megas of the sugar industry from the furnaces, and thus stimulate the coalmining trade, transport, &c. Mr. Campbell showed a number of interesting photographs and fine examples of worked celotex, which he had brought home, the latter demonstrating the readiness of celotex to take paint, calcimine, and wallpaper, its adaptability to decoration by stencilling, and by a paint which produced a stucco effect, and its adhesive qualites as a base for plaster.

Feeding Tests on Dairy Cows.

To determine the effect of succulent feeds on the flavour and odour of milk, and to ascertain the best methods for feeding such crops, the Department of Agriculture, United States of America, has announced the results of a series of tests conducted at one of its experimental farms. In a statement issued on 3rd August the Department says it used selected cows, whose milk was relatively free from abnormal flavours and odours after being fed on a hay and grain ration. The full text of the statement is as follows:—

''To determine whether dried beet pulp, green oats and peas, pumpkins, carrots, sugar beets, rape, soy beans, and kale when fed to dairy cows impart undesirable flavours and odours to the milk, and to ascertain the best methods of feeding such crops and handling the milk, the United States Department of Agriculture has conducted feeding tests at its experiment farm at Beltsville, Md.

''The cows selected for the investigations were giving milk relatively free from abnormal flavours and odours when fed a basic hay and grain ration, and varied in stage of lactation from those fresh to those nearing end of lactation period.

''Besides the succulent feed the animals received, in proportion to milk produced, varying quantities of the following grain mixture:—100 lb. each of hominy feed, bran, and oats, and 50 lb. each cotton seed meal and linseed-oil meal. In addition, they were given all the alfalfa hay they would readily consume. The cows were divided into groups of four each, and interchanged at intervals of four days.

''Dried beet pulp soaked and fed wet one hour before milking in quantities up to 30 lb. produced but a slightly abnormal flavour and odour in the milk. The same ration immediately after milking had no effect on its flavour or odour. Similar results followed the feeding of a like quantity of green oats and peas one hour before and after milking. Both kale and rape fed in similar quantities one hour prior to milking produced a decidedly abnormal flavour and odour in the milk, but had a negligible effect when fed afterward. Soy beans fed one hour before milking tended to improve the flavour and odour of the milk.''

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The Home and the Garden.

THE BABY—ITS CARE AND FEEDING.

The subjoined article is one of a series to be issued by the Queensland Baby Clinics, dealing with infant welfare. These notes have been written in the hope of improving the health and happiness of babies, and of reducing infant mortality to a minimum. In this connection it is an interesting fact that Australia's death rate is lower than that of any other country in the world, excepting New Zealand. Queensland's general death rate is below that of the rest of Australia, and in infant mortality both the State and Commonwealth bear very favourable comparison with other countries. Any further effort to save our babies—Australia's best "immigrants"—and keep the death rate down must meet with ready sympathy and arouse a desire to co-operate practically in the good work.—Ed.

On the treatment and training which an infant receives in the first weeks of life depends greatly its progress during the ensuing twelve months. The opinion is frequently expressed that the new-born baby is too young to be trained; this is a mistake. Even very young babies quickly acquire habits, and it is important that they should be of the right kind.

To delay training until he is a few months old may, and probably will, result in giving mother or nurse a great deal of trouble, and the baby much unnecessary distress. So begin as you mean to go on.

The first bath should be performed quickly. The new-born infant is not yet used to his new surroundings, and is very easily chilled. For this reason, oil and bath him as quickly as you can; dress him, and see that he is warm and comfortable. He will probably be very drowsy and inclined to sleep for some hours. Newly-born infants should sleep more than three parts of their time, and, for the first few days, practically all the time they are not occupied with bathing and feeding.

From birth baby should have his own cot; he should never sleep with his mother. Not only is it healthier for him to sleep alone, but he sleeps better so. Some people think that the baby requires to sleep with his mother for warmth. This is a mistake. A healthy baby will, for most of the year, keep comfortably warm without any external heat other than that supplied by the bed-clothes on his cot. For the coldest months, if he is inclined to be chilly, his bed can be warmed with a hot water bag or bottle, carefully placed with the stopper or cork inclined downwards, so that there is no possibility of baby being burnt, even if the stopper or cork should accidentally come out. He should be accustomed from birth to sleep without a light. People who have had much experience with young babies notice that their sleep is more likely to be sound and undisturbed if there is no light in the room.

The Feeding of the Infant.

Now for the feeding of the new baby. This is a most important matter, and probably more mistakes are made on this than any other point in the management of infants.

Most babies when born know how to suck. It is seldom we find one who cannot do so. This is because, for long ages past, babies have been fed at their mother's breasts, and at birth the sucking instinct is present. This instinct must be developed, but care taken that it is done on the right lines. It must not be either under-developed or over-developed. If baby, who very often in these first days of life is very sleepy indeed, is allowed to sleep almost undisturbed, he may, at the end of a day or two, be very unwilling to work for his living. For that is what sucking is to a baby, and there is no more difficult child to manage than the one who has not been trained to suck properly. Feeding him from a feeding bottle, with the hole in the teat so large that the fluid pours down his throat without effort on his part, will also result in disinclination to suck.

The instinct can be over-stimulated by putting baby too frequently to the breast, or by leaving him there for too long a time. Also by giving him a dummy to suck constantly.

Vigorous sucking is necessary for his health, but it should be done regularly, and at proper feeding-time only. In the early months of life it forms a very important part of baby's daily exercise, for not only does it develop jaws and mouth, but it improves the circulation of the whole body.

There is another reason why baby should be trained to correct feeding habits early. We all know that the mother's full milk supply does not come in until the end of the second or the beginning of the third day after baby's birth. But before the milk comes in there is a little creamy-looking fluid in the breasts. This the baby should have, for, although there is very little, it has high food value, and at this time no other food can take its place. In addition, the mother's health also is benefited, and she makes a quicker recovery if baby is put regularly to the breast at this time.

Put baby to the breast within about six hours of birth—as soon as the mother has rested—leaving him only about two minutes at each breast. See that he is actually sucking, and not dozing. It will be sufficient to do this once every six hours for the first day. On the second day, leave him three or four minutes at each breast, and feed him every four hours. On the third day, when the milk supply is usually established, put him to the breast every three hours, and leave him about fifteen minutes. The average baby takes from fifteen to twenty minutes to feed. No baby should be left at the breast for longer than thirty minutes, and it is only delicate babies or those who suck feebly who should require so long.

Alternate the commencing breast; that is, if you begin by giving the baby the right breast for his first feed, commence with the left for the second, the right again for the third, and so on.

Big, strong babies generally do well if fed every four hours; that is, five feeds daily, from the third day. Others are better on three-hourly feeding (six feeds daily) until they are about three months old. After that time, four-hourly feeding suits most infants, but never jump suddenly from three to four-hourly feeding. Increase the intervals by a quarter of an hour every second or third day until a four-hourly interval is reached. This can be done without baby being aware that any change is being made. Give no night feeds from birth. This is most important. If this is done from the start of life, baby learns to take all that he needs in the day-time. This allows him and his mother to get the regular uninterrupted night's sleep which both require.

No Night Feeds.

A baby trained from birth to have no night feeds takes, during the day, all he requires to satisfy his hunger, and for his growth and development. If fed in the day only, he obtains just as much as if he were being fed both day and night. For example, careful weighing of children before and after feeding has shown that a child having, say, 30 ounces of food in the twenty-four hours, and given six feeds a day, takes 5 ounces at each feed, while if he is fed ten times a day, he takes 3 ounces at each feed, thus obtaining exactly the same quantity of food in the twenty-four hours.

But this training must start at birth. A baby accustomed to being fed night and day will protest vigorously if his mother suddenly lengthens his feeding intervals. He has been trained to frequent feedings, so takes only sufficient to satisfy his hunger for that period. But when started from birth on regular three or four-hourly feeds, with no night feeds, he never expects anything else. So keep absolutely to regular feeding times; make no exceptions. To do so one day will almost certainly result in the baby demanding the same concession the next day. Never hesitate to wake baby during the day when feeding-time comes round. Very soon he will learn to wake himself at the right time. If he is allowed to sleep over his feeding-time during the day, he cannot be expected to sleep all night. He will not have had his full supply of food, so will be hungry and restless.

Natural Food only.

One more very important point before closing. Mention has already been made of the fact that the mother's milk does not come in until the second or third day. As a result, many people think it their duty to give baby artificial food during this time. This is a great mistake, which can lead to much trouble, and in many cases has been responsible for the unnecessary weaning of the baby.

If baby required food during the first two days of his life Nature would supply it. The very fact that it is not there proves it to be unnecessary. As previously mentioned, baby needs the little fluid there is in the mother's breasts at that time, and should be put regularly to the breast to obtain it. Beyond this nothing but plain, boiled water should be given. Babies who are fed on sweetened water or condensed milk as their first food not infrequently refuse to take their natural food later. The reason is simple. Cane sugar, which sweetens both sugar and water and condensed milk, is very sweet. Mother's milk contains a different sugar, called sugar of milk; this is only faintly sweet. Babies like sweet things, and show their preference by refusing to take their proper food.

Important points to remember in feeding baby are:—

Commence training at birth.

Feed regularly; give no night feeds.

Wake baby when necessary during the day.

Make no exceptions.

KITCHEN GARDEN.

A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.

To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry far beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quality and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1) That the fruit must be fully developed, but yet quite firm when gathered.

(2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.

(3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.

(4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

Farm Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstances being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisure-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops

TENDERS FOR LEASES

of State Farms at Hermitage (Warwick) and Warren (Rockhampton).

TENDERS are invited for the leases, as from the 1st February, 1928, of the Warren and Hermitage State Farms, for a period of five years, with a preference for a further three years.

The WARREN STATE FARM has a total area of 1,128¼ acres (approximately 200 acres under cultivation), is situated 17 miles from Rockhampton, and has a frontage of over a mile to the main railway line.

The area situated between the main line and the Westwood-Stanwell road (590 acres in extent) is divided into seventeen paddocks, watered by the Neerkoll Creek, also by a well from which water is pumped by a windmill to an elevated tank and reticulated to the various buildings, yards, and paddocks.

Improvements consist of the manager's house, men's quarters, reinforced concrete twin silos of 200 tons capacity, implement shed combined with storeroom and workshop, stables, loose-box and feedroom with horse yards attached, engine room, dairy cream room and milking shed, chaff room and large feeding shed filled with stalls, cow yard (portion concreted), and concrete dip with yards. Three bull stalls with exercise yards, substantial piggeries with concrete floors and troughs, exercise yards and shelter sheds, calf house with feeding bails and concrete floors, pig food-preparing shed also with concrete floor.

Additional to the above area there are two large grazing paddocks (approximately 360 and 179 acres) separated by a fenced road, situated on the south side of Westwood-Stanwell road, and watered by a well (40 feet), windmill, and 6,000 gallon tank with distributing pipe lines to three contiguous paddocks.

The whole of this property is substantially fenced and the improvements in a first-class state of preservation. The property generally is well suited for carrying on an up-to-date dairy and stud farm.

The HERMITAGE STUD FARM is 5 miles from the town of Warwick, on the main Killarney Railway. The property has a double frontage to the railway line and the railway station, and has an aggregate area of 430 acres, principally arable land, together with all crops growing thereon.

IMPROVEMENTS.—Manager's house (nine rooms, bath, and storeroom), modern barn silo, implement shed, hay shed, stallion box, stables, cartsheds and feed room with enclosed yards, smithy, dairy, cream room, milking shed with bull and calf stalls, men's cottage, sheep dip, draining yards, and shelter shed. The property is watered by a well, also a bore, from which water is lifted by windmills to elevated tanks and reticulated to the various paddocks, and the property has a frontage on its south side to Swan Creek. The area on the south side of the railway line (230 acres, divided into nine paddocks) is enclosed with a wire-netted boundary fence, whilst the major portion of that on the north (190 acres, divided into seven paddocks) is similarly fenced.

An inspection of both properties can be arranged by communicating direct with the Managers of the Farms concerned.

It is proposed to hold, about the middle of January, an auction sale of the stud and farm stock and the farming implements at both the Farms.

Forms of Tender may be obtained on application to the Managers of the Farms, and from the Department of Agriculture and Stock, Brisbane.

Tenders, which should be marked "State Farm Tenders," will close on 23rd December, 1927, and should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane, from whom any further particulars may be obtained.

The highest or any tender not necessarily accepted.

E. GRAHAM, Under Secretary,
Department of Agriculture and Stock, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	December. 1927.		January. 1928.		MOONRISE. Dec. 1927.	MOONRISE. Jan. 1928.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	4.50	6.32	5.1	6.49	a.m. 10.31	p.m. 12.32
2	4.50	6.32	5.2	6.49	11.34	1.35
3	4.50	6.33	5.3	6.49	p.m. 12.35	2.40
4	4.50	6.34	5.3	6.50	1.39	3.47
5	4.50	6.35	5.4	6.50	2.42	4.54
6	4.50	6.35	5.5	6.50	3.49	5.57
7	4.50	6.36	5.6	6.51	4.56	7.0
8	4.50	6.37	5.6	6.51	6.6	7.54
9	4.50	6.37	5.7	6.51	7.15	8.45
10	4.51	6.38	5.8	6.51	8.19	9.25
11	4.51	6.39	5.9	6.51	9.16	10.2
12	4.51	6.40	5.9	6.51	10.8	10.34
13	4.51	6.40	5.10	6.51	10.52	11.3
14	4.52	6.41	5.11	6.51	11.30	11.33
15	4.52	6.41	5.12	6.51	...	...
16	4.52	6.42	5.13	6.51	a.m. 12.4	a.m. 12.3
17	4.52	6.43	5.13	6.51	12.35	12.34
18	4.53	6.43	5.14	6.51	1.3	1.9
19	4.53	6.44	5.15	6.51	1.33	1.46
20	4.54	6.44	5.16	6.50	2.3	2.30
21	4.54	6.45	5.16	6.50	2.36	3.20
22	4.55	6.46	5.17	6.50	3.13	4.15
23	4.55	6.46	5.18	6.49	3.52	5.13
24	4.56	6.47	5.19	6.49	4.39	6.15
25	4.56	6.47	5.19	6.49	5.30	7.19
26	4.57	6.47	5.20	6.48	6.25	8.22
27	4.57	6.48	5.21	6.48	7.24	9.25
28	4.58	6.48	5.22	6.48	8.25	10.26
29	4.59	6.48	5.23	6.47	9.27	11.29
30	5.0	6.49	5.24	6.47	10.28	p.m. 12.32
31	5.0	6.49	5.25	6.47	11.30	1.37

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

2 Dec.	☾	First Quarter	12 14 p.m.
9 „	○	Full Moon	8 32 a.m.
16 „	☽	Last Quarter	10 3 a.m.
24 „	●	New Moon	2 18 p.m.
31 „	☾	First Quarter	9 22 p.m.

Perigee 7th December, at 7 11 a.m.
Apogee 19th December, at 8 24 a.m.

In the early dawn on the 9th, near the eastern horizon, the planets Mercury and Mars may be observed to be in close conjunction, Mercury being about one degree northward of Mars. Before the Sun rises Saturn will also be over the eastern horizon, but quite unobservable.

On 20th December, about 2 p.m., Venus will be near the southern or upper edge of the Moon as seen from Queensland. A pair of binoculars may be necessary to see Venus at such an hour in the day, but probably many keen eyes may detect it without them. Had it not been for the considerable declension of the brilliancy of Venus since 17th October, the daylight spectacle would have been a much more interesting one.

7 Jan.	○	Full Moon	4 7 p.m.
15 „	☽	Last Quarter	7 13 a.m.
23 „	●	New Moon	6 18 a.m.
30 „	☾	First Quarter	5 25 a.m.

Perigee 4th January, at 8 36 a.m.
Apogee 16th January, at 4 48 a.m.
Perigee 29th January, 9 30 p.m.

On the 4th, the Earth will reach that part of its orbit which is nearest the Sun. It will then be three million miles nearer to it than on the 4th July.

The occultation of Omega Tauri by the Moon on the 4th soon after 7 p.m. may be fairly well observed in a telescope or binoculars at such positions as Rockhampton, Gympie, Maryborough, Brisbane, Warwick, and Toowoomba, although the twilight will somewhat interfere with the disappearance of the star on the dark edge of the Moon; at the time of reappearance about an hour later, at the bright side, the greater darkness will improve the effect.

On the 8th soon after 4 a.m. it will be interesting to watch the occultation of Kappa Geminorum by the Moon, with telescope or binoculars, at places as far south as Warwick, on account of its nearness to the southern edge of the Moon.

An unusually favourable opportunity to find the planet Neptune will occur on the 8th after about 10 p.m. The planet will be remarkably close to Regulus, the brightest star of Leo, which will rise about 9 p.m. about 12½ degrees (twice the length of the Southern Cross) north of east. Binoculars or telescope will be required to see Neptune, which appears as a very small star, below naked-eye visibility, its distance being over 2,700 million miles.

Mercury will be on the far side of its orbit, nearly behind the Sun on the 9th; two degrees above it at midday.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises; and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

I.A.R.I.

INDIAN AGRICULTURAL RESEARCH
INSTITUTE LIBRARY,
NEW DELHI.

Date of issue.	Date of issue.	Date of issue.

MGIPC—S5—38 AR/54—7-7-54—7,000.